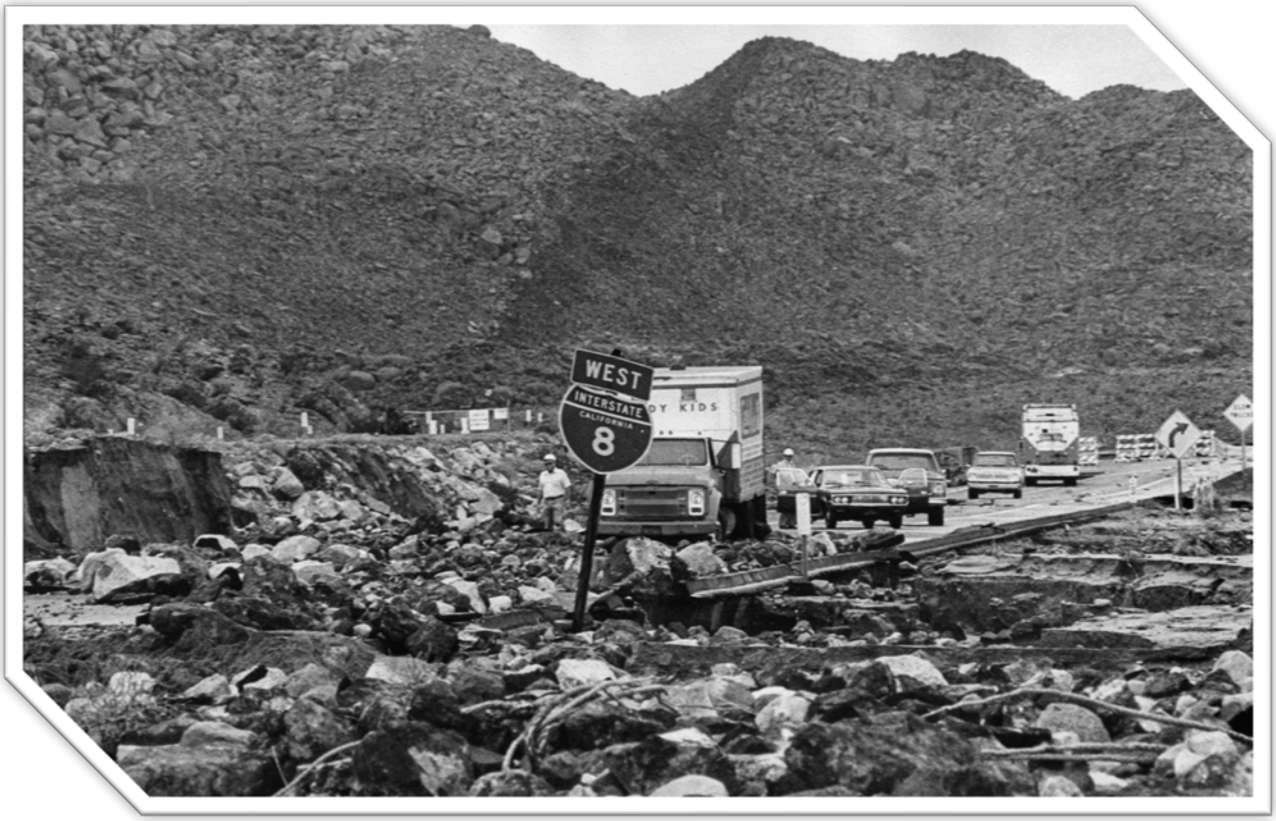
IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT



Los Angeles Times Photography, August 17, 1977 Interstate 8 is impassable in the Imperial Valley after heavy rains from former Hurricane Doreen moved massive boulders and left then on the highway.
http://framework.latimes.com/2016/10/12/former-hurricane-doreen-closes-interstate-8/#/0

October 31, 2014 and November 1, 2014
Exceptional Event Documentation
For the Imperial County PM_{10} Nonattainment Area

FINAL REPORT

October 2, 2018

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ACRONYM	DESCRIPTIONS
AOD	Aerosol Optical Depth
AQI	Air Quality Index
AQS	Air Quality System
BACM	Best Available Control Measures
BAM 1020	Beta Attenuation Monitor Model 1020
BLM	United States Bureau of Land Management
BP	United States Border Patrol
CAA	Clean Air Act
CARB	California Air Resources Board
CMP	Conservation Management Practice
DCP	Dust Control Plan
DPR	California Department of Parks and Recreation
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GOES-W/E	Geostationary Operational Environmental Satellite (West/East)
HC	Historical Concentrations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
INPEE	Initial Notification of a Potential Exceptional Event
ITCZ	Inter Tropical Convergence Zone
KBLH	Blythe Airport
KCZZ	Campo Airport
KIPL	Imperial County Airport
KNJK	El Centro Naval Air Station
KNYL/MCAS	Yuma Marine Corps Air Station
KPSP/PSP	Palm Springs International Airport
KTRM	Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport)
LST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MODIS	Moderate Resolution Imaging Spectroradiometer
MPH	Miles Per Hour
MST	Mountain Standard Time
NAAQS	National Ambient Air Quality Standard
NCAR	National Center for Atmospheric Research
NCEI	National Centers for Environmental Information
NEAP	Natural Events Action Plan
NEXRAD	Next-Generation Radar
NOAA	National Oceanic and Atmospheric Administration
nRCP	Not Reasonably Controllable or Preventable
NWS	National Weather Service

PDT	Pacific Daylight Time
PM_{10}	Particulate Matter less than 10 microns
$PM_{2.5}$	Particulate Matter less than 2.5 microns
PST	Pacific Standard Time
QA/QC	Quality Assured and Quality Controlled
QCLCD	Quality Controlled Local Climatology Data
RACM	Reasonable Available Control Measure
RAWS	Remote Automated Weather Station
SIP	State Implementation Plan
SLAMS	State Local Ambient Air Monitoring Station
SMP	Smoke Management Plan
SSI	Size-Selective Inlet
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTC	Coordinated Universal Time
WRCC	Western Regional Climate Center

I Introduction

On October 31, 2014 and November 1, 2014, the State and Local Ambient Air Monitoring Stations (SLAMS) located in Brawley (AQS Site Code 06-025-0007), Westmorland (AQS Site Code 06-025-4003) and Niland (AQS Site Code 06-025-4004), California measured an exceedance of the National Ambient Air Quality Standard (NAAQS). The Federal Equivalent Method (FEM), Beta Attenuation Monitor Model 1020 (BAM 1020) measured (midnight to midnight) 24-hour (hr) average, Particulate Matter less than 10 microns (PM_{10}), concentrations of 181 µg/m^3, and 218 µg/m^3. In addition, the Federal Reference Method (FRM), Size Selective Inlet (SSI) High Volume Gravimetric sampler, measured (midnight to midnight) 24-hr average PM_{10} concentrations of 471 µg/m^3, 173 µg/m^3 and 404 µg/m^3 (**Table 1-1**). PM_{10} 24-hr measurements measured above the 150 µg/m^3 are exceedances of the NAAQS. The SLAMS in Brawley, Westmorland and Niland were the only monitors to measure an exceedance of the PM_{10} NAAQS on October 31, 2014 and November 1, 2014.

TABLE 1-1
CONCENTRATIONS OF PM_{10} ON OCTOBER 31, 2014 AND NOVEMBER 1, 2014

DATE	MONITORING SITE	AQS ID	POC(s)	HOURS	24-HOUR CONCENTRATION µg/m^3	PM_{10} NAAQS µg/m^3
10/31/2014	**Niland**	**06-025-4004**	**3**	**24**	**181**	**150**
11/1/2014	**Brawley**	**06-025-0007**	**1**	**24**	**471**	**150**
11/1/2014	**Niland**	**06-025-4004**	**1**	**24**	**173**	**150**
11/1/2014	**Niland**	**06-025-4004**	**3**	**24**	**218**	**150**
11/1/2014	**Westmorland**	**06-025-4003**	**1**	**24**	**404**	**150**
10/31/2014	Brawley	06-025-0007	3	24	116	150
11/1/2014	Brawley	06-025-0007	3	24	131	150
11/1/2014	Calexico	06-025-0005	1	24	-	150
11/1/2014	El Centro	06-025-1003	2	24	56	150

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted[1]
October 31, 2014 was not a scheduled sample run day. On November 1, 2014 the Calexico FRM (filter based) sampler failed to run

The Imperial County Air Pollution Control District (ICAPCD) has been submitting PM_{10} data from FRM SSI instruments since 1986 into the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS). Prior to 2013 all continuous measured PM_{10} data was non-regulatory, thus measured in local conditions. However, by 2013 ICAPCD began formally submitting continuous FEM PM_{10} data from BAM 1020's into the USEPA managed AQS. Because regulatory consideration of reported data must be in standard conditions, as required by USEPA, all continuous PM_{10} data since 2013 is regulatory. On October 31, 2014 and November 1, 2014

[1] According to the National Institute of Standards and Technology (NIST) Time and Frequency Division the designation of the time of day for specific time zones are qualified by using the term "standard time" or "daylight time". For year-round use the designation can be left off inferring "local time" daylight or standard whichever is present. For 2014, Pacific Daylight Time (PDT) is March 9 through November 2. https://www.nist.gov/pml/time-and-frequency-division/local-time-faqs#intl

the Brawley, Westmorland and Niland monitors were impacted by elevated particulate matter caused by the transport of fugitive windblown dust from high winds generated by the passing of a cold front with associated major east Pacific trough moving into southern California then east through Imperial County.[2]

This report demonstrates that a naturally occurring event caused an exceedance observed on October 31, 2014 and November 1, 2014, which elevated particulate matter and affected air quality. The report provides concentration to concentration monitoring site analyses supporting a clear causal relationship between the event and the monitored exceedances and provides an analysis supporting the not reasonably controllable or preventable (nRCP) criteria. Furthermore, the report provides information that the exceedances would not have occurred without the entrainment of fugitive windblown dust from outlying deserts and mountains within the Sonoran Desert. The document further substantiates the request by the ICAPCD to exclude PM_{10} 24-hour NAAQS exceedances of 181 µg/m^3, 471 µg/m^3, 173 µg/m^3, 218 µg/m^3, and 404 µg/m^3 (**Table 1-1**) as an exceptional event. This demonstration substantiates that this event meets the definition of the USEPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER)[3].

I.1 Demonstration Contents

Section II - Describes the October 31. 2014 and November 1, 2014 event as it occurred in California and into Imperial County, providing background information of the exceptional event and explaining how the event affected air quality. Overall, this section provides the evidence that the event was a natural event.

Section III - Using time-series graphs, summaries and historical concentration comparisons of the Brawley, Niland and Westmorland stations this section discusses and establishes how the October 31, 2014 and November 1, 2014 event affected air quality such that a clear causal relationship exists between the event and the monitored exceedance. It is perhaps of some value to mention that the time-series graphs include PM_{10} data measured in both local conditions and standard conditions. Measured PM_{10} continuous data prior to 2013 is in local conditions, all other data is in standard conditions. The concentration difference between local and standard conditions has an insignificant impact on any data analysis. Overall, this section provides the evidence that human activity played little or no direct causal role in the October 31, 2014 and November 1, 2014 event and its resulting emissions defining the event as a "natural event".[4]

Section IV - Provides evidence that the event of October 31, 2014 and November 1, 2014 was not reasonably controllable or preventable despite the full enforcement and implementation of Best Available Control Measures (BACM).

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[2] Area Forecast Discussion National Weather Service San Diego CA 815 PM PST (915 PM PDT) Friday, October 31, 2014 and 758 PM PST (858 PM PDT) Saturday, November 1, 2014; Phoenix AZ 200 AM PST (300 AM MST) Saturday, November 1, 2014

[3] "Treatment of Data Influenced by Exceptional Events; Final Rule", 72 FR 13560, March 22, 2007.

[4] Title 40 Code of Federal Regulations part 50: §50.1(k) Natural event means an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions.

Section V - Brings together the evidence presented within this report to show that the exceptional event affected air quality; that the event was not reasonably controllable or preventable; that there was a clear causal relationship between the event and the exceedance, and that the event was a natural event.

I.2 Requirement of the Exceptional Event Rule

The above sections combined comprise the technical requirements described under the Exceptional Events Rule (EER) under 40 CFR §50.14(c)(3)(iv). However, in order for the USEPA to concur with flagged air quality monitoring data, there are additional non-technical requirements.

I.2.a Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

The ICAPCD provided a weekend notification via the ICAPCD's webpage summarizing the National Weather Service (NWS) area forecast discussions. The ICAPCD notice included a discussion of the potential of elevated winds on October 31, 2014 through the weekend. The discussion explain that forecasted winds by the NWS of 10 to 20 miles per hour (mph) with potential gusts up to 50 mph could affect the region potentially elevating particulate matter. Because of the potential for suspended particles and poor air quality, on October 31, 2014 and November 1, 2014 the ICAPCD issued a "Marginal Green waste only" burn day and a "No Burn" day, respectively. Included in the discussion was the NWS discussion forecasting the potential for blowing sand and dust. **Appendix A** contains copies of notices pertinent to the October 31, 2014 and November 1, 2014 event.

I.2.b Initial Notification of Potential Exceptional Event (INPEE) (40 CFR §50.14(c)(2))

States are required under federal regulation to submit measured ambient air quality data into the AQS. AQS is the federal repository of Quality Assured and Quality Controlled (QA/QC) ambient air data used for regulatory purposes. When States intend to request the exclusion of one or more exceedances of a NAAQS as an exceptional event a notification to the Administrator is required. Notification occurs when an agency submits a request, which includes an initial event description, for flagging data in AQS.

On October 3, 2016, the US EPA promulgated revisions to the Exceptional Events rule, which included the requirement of an "Initial Notification of Potential Exceptional Event" (INPEE) process. This revised INPEE process requires communication between the US EPA regional office and the State, prior to the development of a demonstration. The intent of the INPEE process is twofold: to determine whether identified data may affect a regulatory decision and whether a State should develop/submit an EE Demonstration.

The ICAPCD made a formal written request to the California Air Resources Board (CARB) to place preliminary flags on the SLAMS measured concentrations from the Brawley monitor. The request, dated May 28, 2015 requested an initial flag for the measurements from either BAM

1020 monitors or FRMs in Brawley, Niland and Westmorland (**Table 1-1**). Subsequently, after submittal of the request, CARB received corrected FEM data measurements in standard conditions, originally submitted in local conditions. USEPA requires data in standard conditions when making regulatory decisions. **Table 1-1** above provides the PM_{10} measured concentrations for all monitors in Imperial County for October 31, 2014 and November 1, 2014. The difference in concentrations between local and standard has an insignificant impact on any data analysis. The submitted request included a brief description of the meteorological conditions for October 31, 2014 and November 1, 2014 indicating that a potential natural event occurred.

I.2.c Documentation that the public comment process was followed for the event demonstration that was flagged for exclusion (40 CFR §50.14(c)(3)(v))

The ICAPCD posted, for a 30-day public review, a draft version of this demonstration on the ICAPCD webpage and published a notice of availability in the Imperial Valley Press on April 20, 2018. The published notice invited comments by the public regarding the request, by the ICAPCD, to exclude the measured concentrations of 181 µg/m^3, 471 µg/m^3, 173 µg/m^3, 218 µg/m^3, and 404 µg/m^3 (**Table 1-1**), which occurred on October 31, 2014 and November 1, 2014 in Brawley, Niland and Westmorland. The final closing date for comments was May 21, 2018. **Appendix A** contains a copy of the public notice affidavit along with any comments received by the ICAPCD for submittal as part of the demonstration (40 CFR §50.14(c)(3)(v)).

I.2.d Documentation submittal supporting an Exceptional Event Flag (40 CFR §50.14(c)(3)(i))

States that have flagged data as a result of an exceptional event and who have requested an exclusion of said flagged data are required to submit a demonstration that justifies the data exclusion to the USEPA in accordance with the due date established by USEPA during the INPEE process (40 CFR §50.14(c)(2)). Currently, bi-weekly meetings between USEPA, CARB and Imperial County continue to discuss any potential documentation of events.

The ICAPCD, after the close of the comment period and after consideration of the comments will submit this demonstration along with all required elements, including received comments and responses to USEPA Region 9 in San Francisco, California. The submittal of the October 31, 2014 and November 1, 2014 demonstration will have a regulatory impact upon the development and ultimate submittal of the PM_{10} State Implementation Plan for Imperial County in 2018.

I.2.e Necessary demonstration to justify an exclusion of data under (40 CFR§50.14(c)(3)(iv))

A This demonstration provides evidence that the event, as it occurred on October 31, 2014 and November 1, 2014, satisfies the definition in 40 CFR §50.1(j) and (k) for an exceptional event.

a The event created the meteorological conditions that entrained emissions and caused the exceedance.

- b The event clearly "affects air quality" such that there is the existence of a clear causal relationship between the event and the exceedance.
- c Analysis demonstrates that the event-influenced concentrations compared to concentrations at the same monitor at other times supports the clear causal relationship.
- d The event "is not reasonably controllable and not reasonably preventable."
- e The event is "caused by human activity that is unlikely to recur at a particular location or [is] a natural event."
- f The event is a "natural event" where human activity played little or no direct causal role.

B This demonstration provides evidence that the exceptional event affected air quality in Imperial County by demonstrating a clear causal relationship between the event and the measured concentrations in Brawley, Niland and Westmorland.

C This demonstration provides evidence of the measured concentrations to concentrations at the same monitor at other times supporting the clear causal relationship between the event and the affected monitor.

II October 31, 2014 and November 1, 2014 Conceptual Model

This section provides a summary description of the meteorological and air quality conditions under which the October 31, 2014 and November 1, 2014 event unfolded in Imperial County. The subsection elements include

- » A description and map of the geographic setting of the air quality and meteorological monitors
- » A description of Imperial County's climate
- » An overall description of meteorological and air quality conditions on the event day.

II.1 Geographic Setting and Monitor Locations

According to the United States Census Bureau, Imperial County has a total area of 4,482 square miles of which 4,177 square miles is land and 305 square miles is water. Much of Imperial County is below sea level and is part of the Colorado Desert an extension of the larger Sonoran Desert (**Figure 2-1)**.The Colorado Desert not only in includes Imperial County but a portion of San Diego County.

FIGURE 2-1
COLORADO DESERT AREA IMPERIAL COUNTY

Fig 2-1: 1997 California Environmental Resources Evaluation System. According to the United States Geological Survey (USGS) Western Ecological Research Center, the Colorado Desert bioregion is part of the bigger Sonoran Desert Bioregion, which includes the Colorado Desert and Upper Sonoran Desert sections of California and Arizona, and a portion of the Chihuahuan Basin and Range Section in Arizona and New Mexico (Forest Service 1994)

A notable feature in Imperial County is the Salton Sea, which is at approximately 235 feet below sea level. The Chocolate Mountains are located east of the Salton Sea and extend in a northwest-southeast direction for approximately 60 miles (**Figure 2-2)**. In this region, the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect the northern-most extensions of the East Pacific rise. Consequently, the region is subject to earthquakes and the crust is being stretched, resulting in a sinking of the terrain over time.

FIGURE 2-2
SURROUNDING AREAS OF THE SALTON SEA

Fig 2-2: Image courtesy of the Image Science and Analysis Laboratory NASA Johnson Space Center, Houston Texas

All of the seven incorporated cities, including the unincorporated township of Niland, are surrounded by agricultural fields to the north, east, west and south (**Figure 2-6)**. Together, the incorporated cities, including Niland, and the agricultural fields make what is known as the Imperial Valley. Surrounding the Imperial Valley are desert areas found on the eastern and western portions of Imperial County.

The desert area, found within the western portion of Imperial County is of note because of its border with San Diego County. From west to east, San Diego County stretches from the Pacific Ocean to its boundary with Imperial County. San Diego County has a varied topography. On its western side is 70 miles (110 km) of coastline. Most of San Diego between the coast and the Laguna Mountains consists of hills, mesas, and small canyons. Snow-capped (in winter) mountains rise to the northeast, with the Sonoran Desert to the far east. Cleveland National Forest is spread across the central portion of the county, while the Anza-Borrego Desert State Park occupies most of the northeast. The southeastern portion of San Diego County is comprised of distinctive Peninsular mountain ranges. The mountains and deserts of San Diego comprise the eastern two-thirds of San Diego County and are primarily undeveloped back county with a native plant community known as chaparral. Of the nine major mountain ranges within San Diego County, the In-Ko-Pah Mountains and the Jacumba Mountains border Mexico and Imperial County.

Both mountain ranges provide the distinctive weathered dramatic piles of residual boulders that can be seen while driving Interstate 8 from Imperial County through Devil's Canyon and In-Ko-Pah Gorge. Interstate 8 runs along the US border with Mexico from San Diego's Mission Bay to just southeast of Casa Grande Arizona.

FIGURE 2-3
JACUMBA PEAK

Fig 2-3: The Jacumba Mountains reach an elevation of 4,512 feet (1,375 m) at Jacumba Peak, near the southern end of the chain. Source: Wikipedia at https://en.wikipedia.org/wiki/Jacumba_Mountains

Northwest and northeast of the Jacumba Mountains is the Tierra Blanca Mountains, the Sawtooth Mountains and Anza-Borrego Desert State Park. Within the mountain ranges and the Anza-Borrego Desert State Park, there exists the Vallecito Mountains, the Carrizo Badlands, the Carrizo Impact Area, Coyote Mountains and the Volcanic Hills to name of few. Characteristically, these areas all have erosion that has occurred over time that extends from the Santa Rosa Mountains into northern Baja California in Mexico. For example, the Coyote Mountains consists of sand dunes left over from the ancient inland Sea of Cortez. Much of the terrain is still loose dirt, interspersed with sandstone and occasional quartz veins. The nearest community to the Coyote Mountain range is the community of Ocotillo. Of interest are the fossilized and hollowed out sand dunes that produce wind caves.

FIGURE 2-4
ANZA-BORREGO DESERT STATE PARK
CARRIZO BADLANDS

Fig 2-4: View southwest across the Carrizo Badlands from the Wind Caves in Anza-Borrego Desert State Park. Source: Wikipedia at https://en.wikipedia.org/wiki/Carrizo_Badlands

The Carrizo Badlands, which includes the Carrizo Impact Area used by the US Navy as an air-to-ground bombing range during World War II and the Korean War, lies within the Anza-Borrego Desert State Park. The Anza-Borrego Desert State Park is located within the Colorado Desert, is the largest state park in California occupying eastern San Diego County, reaching into Imperial and Riverside counties. The two communities within Anza-Borrego Desert State Park are Borrego Springs and Shelter Valley.

The Anza-Borrego Desert State Park lies in a unique geologic setting along the western margin of the Salton Trough. The area extends north from the Gulf of California to San Gorgonio Pass and from the eastern rim of the Peninsular Ranges eastward to the San Andreas Fault zone along the far side of the Coachella Valley. The Anza-Borrego region changed gradually over time from intermittently being fed by the Colorado River Delta to dry lakes and erosion from the surrounding mountain ranges. The area located within the southeastern and northeastern section of San Diego County is a source of entrained fugitive dust emissions that affect Imperial County when westerly winds funnel through the unique landforms causing in some cases wind tunnels that cause increases in wind speeds.

Historical observations have indicated that the desert slopes and mountains of San Diego are a source of fugitive emissions along with those deserts located to the east and west of Imperial County, which extend into Mexico (Sonoran Desert, **Figure 2-7**). Combined, the desert areas and mountains of San Diego and the desert areas that extend into Mexico are sources of dust emissions, which affect the Imperial County during high wind events.

FIGURE 2-5
ANZA-BORREGO DESERT STATE PARK
DESERT VIEW FROM FONT'S POINT

Fig 2-5: Desert view from Font's Point. Source: Font's Point Anza-Borrego Photographed by and copyright of (c) David Corby; Wikipedia at https://en.wikipedia.org/wiki/Anza-Borrego_Desert_State_Park

FIGURE 2-6
LOCATION AND TOPOGRAPHY OF IMPERIAL COUNTY

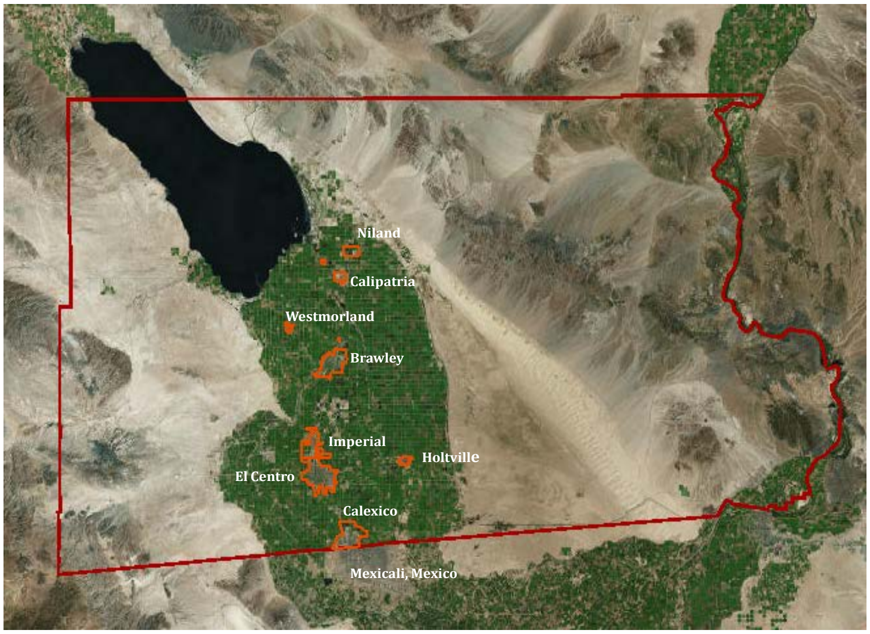

Fig 2-6: Depicts the seven incorporated cities within Imperial Valley - City of Calipatria, City of Westmorland, City of Brawley, City of Imperial, City of El Centro, City of Holtville, and the City of Calexico. Niland is unincorporated. Mexicali, Mexico is to the south

FIGURE 2-7
DESERTS IN CALIFORNIA, YUMA AND MEXICO

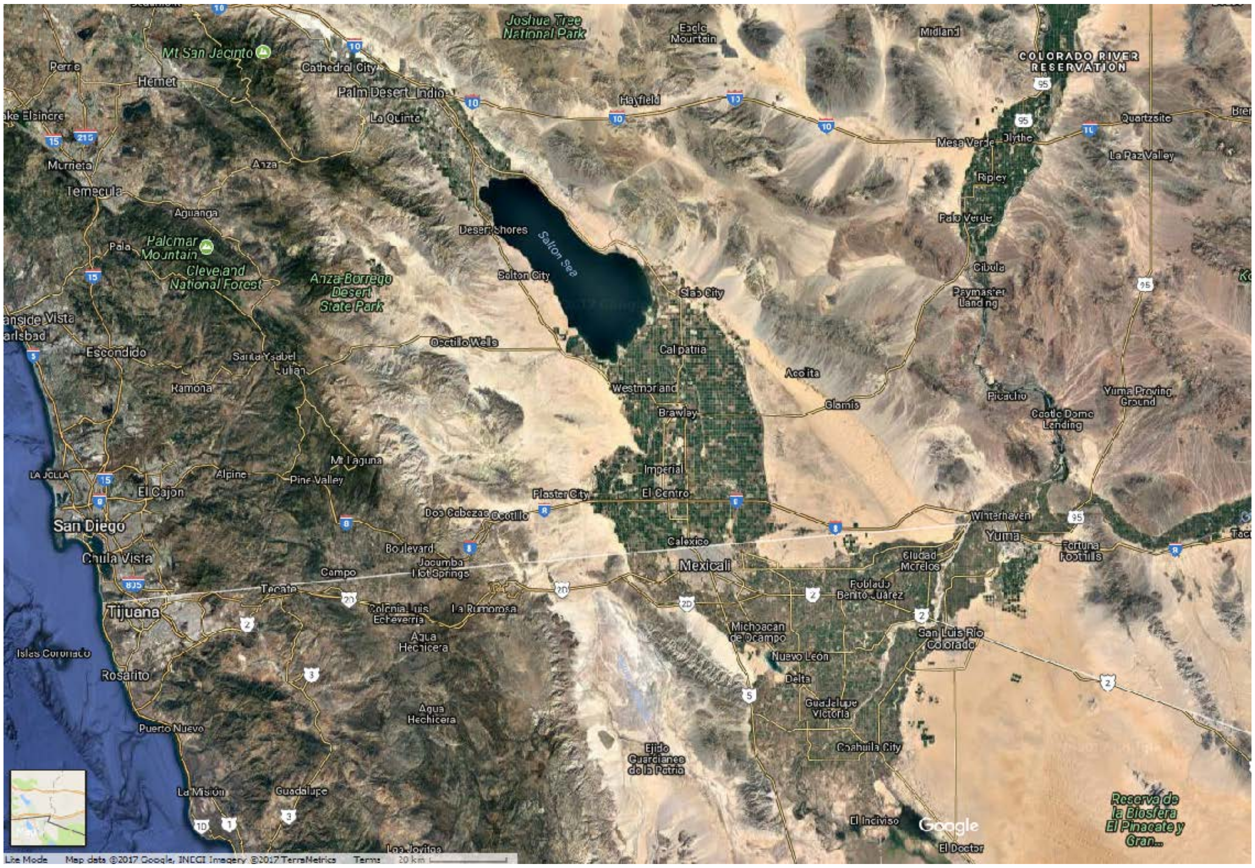

Fig 2-7: Depicts the Sonoran Desert as it extends from Mexico into Imperial County. Source: Google Earth Terra Matrics

The air quality and meteorological monitoring stations used in this demonstration are shown in **Figure 2-8**. Of the five SLAMS within Imperial County, four stations measure both meteorological and air quality data. These SLAMS are located in Calexico, El Centro, Westmorland, and Niland; the station located in Brawley only measures air quality. Other air monitoring stations measuring air quality and meteorological data used for this demonstration include stations in eastern Riverside County, southeastern San Diego County and southwestern Arizona (Yuma County) (**Figure 2-8 and Table 2-1)**.

As mentioned above, the PM_{10} exceedances on October 31, 2014 and November 1, 2014, occurred at the Brawley, Niland and Westmorland stations. The Brawley, Niland and Westmorland stations are regarded as the "northern" monitoring sites within the Imperial County air monitoring network. In order to properly analyze the contributions from meteorological conditions occurring on October 31, 2014 and November 1, 2014, other meteorological sites were used in this demonstration which include airports in eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), Imperial County, and other sites relevant to the wind event, such as within northern Mexico. (**Figure 2-8 and Appendix B)**.

FIGURE 2-8
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

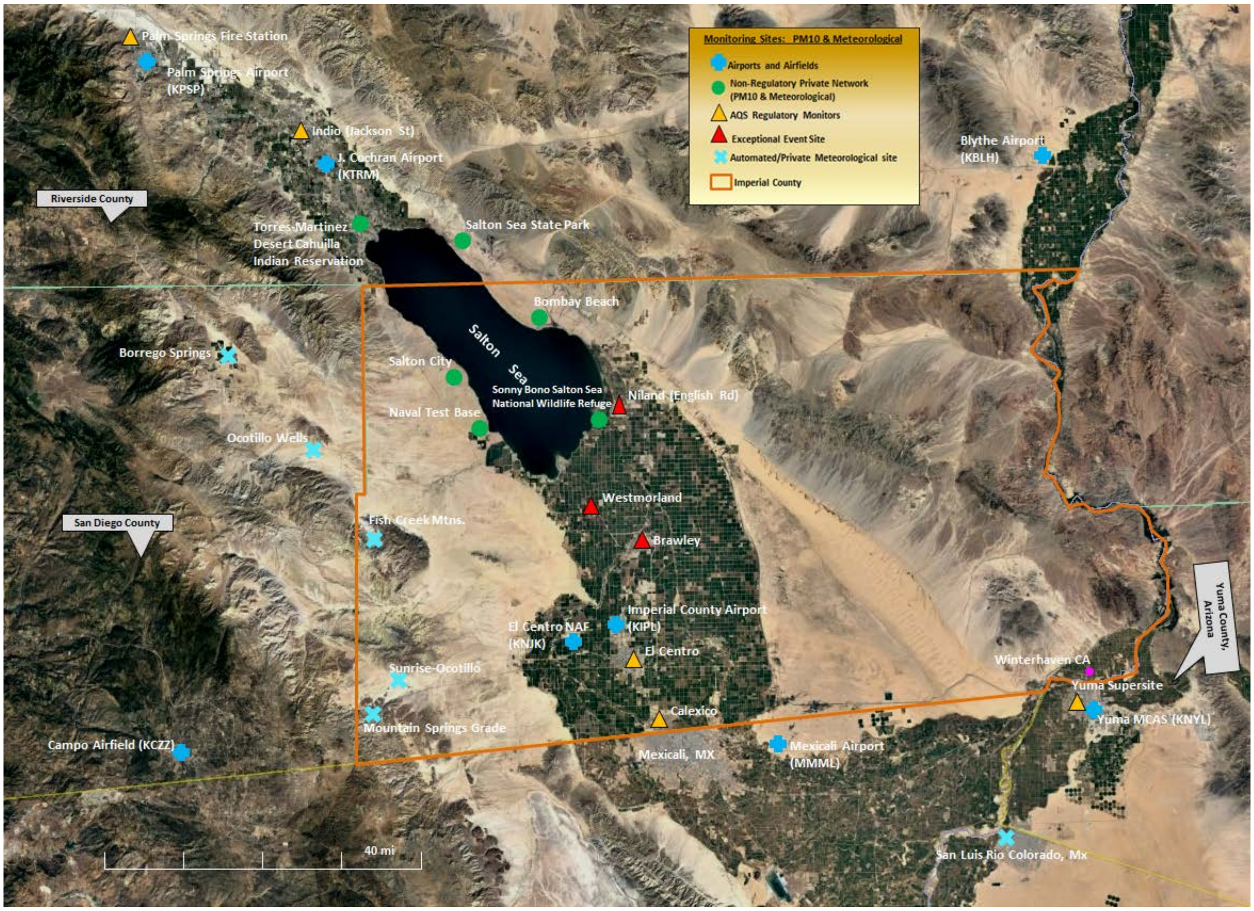

Fig 2-8: Depicts a select group of meteorological and PM_{10} monitoring sites in Imperial County, eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), and northern Mexico. The image provides the location of potential sites used to gather data in support of an Exceptional Event Demonstration. Source: Google Earth.

In addition to meteorological sites, there are non-regulatory PM_{10} sites located around the Salton Sea that maybe referenced as an aid to help the reader understand the direction and velocity of winds that affect Imperial County. Unless, otherwise specifically indicated concentration references do not imply emissions from the surrounding playa of the Salton Sea. Three sites, in specific, are the Salton City air monitoring station, the Naval Test Base air monitoring station and the Sonny Bono air monitoring station. These privately owned stations are non-regulatory (**Figures 2-9 to 2-12**). The Salton City station is located 33.27275°N latitude and 115.90062˚W longitude, on the western edge of the Salton Sea (**Figure 2-9**). The station abuts a water reservoir along the Salton Sea with surrounding chaparral vegetation and unpaved open areas and roads. The Naval Test Base station is located 33.16923°N latitude and 115.85593˚W longitude, on the southwestern edge of the Salton Sea (**Figure 2-11**). The station sits on an abandoned US Military site, still owned by the Department of Defense. Unlike the Salton City station, light chaparral vegetation and sandy open dune areas surround the Naval Test Base station. Directly to the west of the station is an orchard. The Sonny Bono station is located 33.17638°N latitude and 115.62310˚W longitude, on the southern portion of the Salton Sea within the Sonny Bono Salton Sea Wildlife Refuge. The Sonny Bono Salton Sea National Wildlife Refuge is 40 miles north of the Mexican border at the southern end of the Salton Sea within the Sonoran Desert. The Refuge has two separate managed units, 18 miles apart. Each unit contains wetland habitats, farm fields, and tree rows. The land of the Salton Sea Refuge is flat, except for Rock Hill, a small, inactive volcano, located near Refuge Headquarters. Bordering the Refuge is the Salton Sea on the north and farmlands on the east, south, and west.

FIGURE 2-9
SALTON CITY AIR MONITORING STATION

Fig 2-9: Depicts the Salton City air monitoring (circled) site operated by a private entity. View site photos at the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-10
SALTON CITY AIR MONITORING STATION
WEST

Fig 2-10: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-11
NAVAL TEST BASE AIR MONITORING STATION

Fig 2-11: Depicts the Naval Test Base air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13603&date=17

FIGURE 2-12
NAVAL TEST BASE AIR MONITORING STATION
WEST

Fig 2-12: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-13
SONNY BONO AIR MONITORING STATION

Fig 2-13: Depicts the Sonny Bono air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-14
SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE

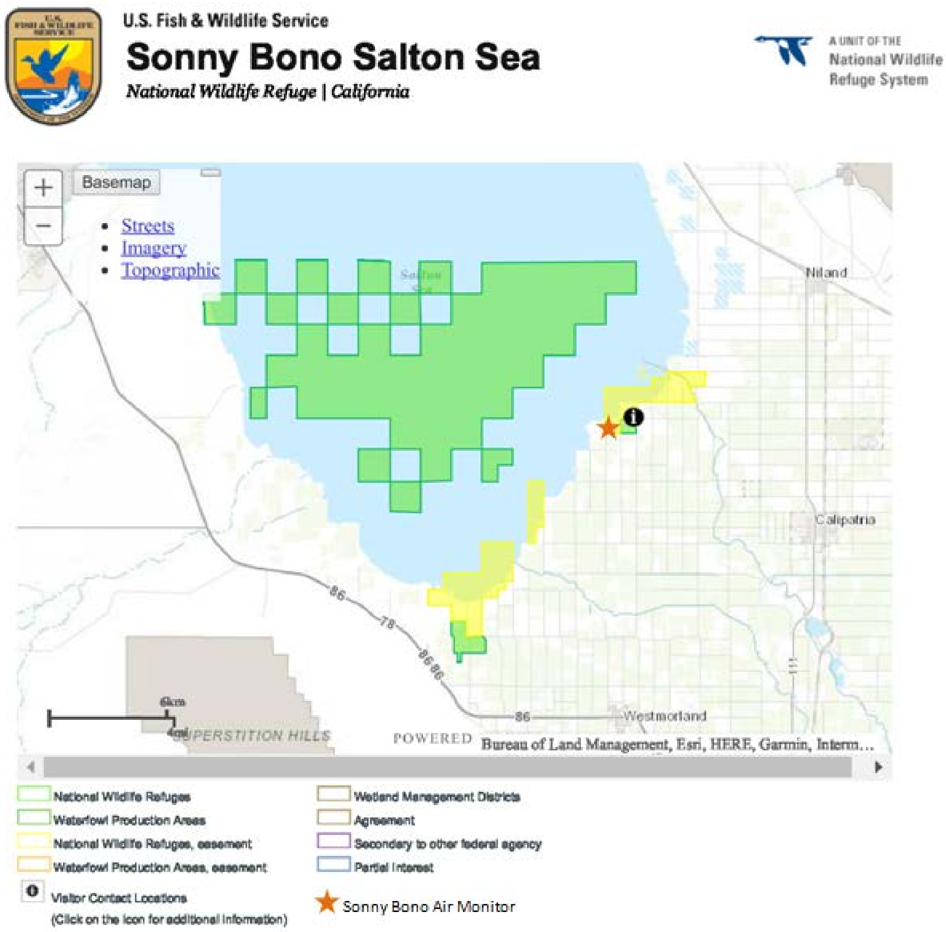

Fig 2-14: The Sonny Bono Wildlife Refuge has about 2,000 acres that are farmed and managed for wetlands. In 1998, the Refuge was renamed after Congressman Sonny Bono, who helped inform the U.S. Congress of the environmental issues facing the Salton Sea as well as acquiring funding for this Refuge to help it respond to avian disease outbreaks and other habitat challenges at the Salton Sea. Source: https://www.fws.gov/refuge/Sonny_Bono_Salton_Sea/about.html

TABLE 2-1
MONITORING SITES IN IMPERIAL COUNTY, RIVERSIDE COUNTY AND ARIZONA
OCTOBER 31, 2014 AND NOVEMBER 1, 2014

Monitor Site Name	*Operator	Monitor Type	AQS ID	AQS PARAMETER CODE	ARB Site Number	Elevation (meters)	Day	24-hr PM_{10} ($\mu g/m^3$) Avg	1-hr PM_{10} ($\mu g/m^3$) Max	**Time of Max Reading	Max Wind Speed (mph)	**Time of Max Wind Speed
IMPERIAL COUNTY												
Brawley-Main Street #2	ICAPCD	Hi-Vol Gravimetric	06-025-0007	(81102)	13701	-15	31	-	-	-	-	-
		BAM 1020						116	700	2200		
		Hi-Vol Gravimetric					01	471	-	-	-	-
		BAM 1020						131	437	400		
Calexico-Ethel Street	CARB	Hi-Vol Gravimetric	06-025-0005	(81102)	13698	3	31	-	-	-	9.8	2300
							01	-	-	-	16.7	1300
El Centro-9th Street	ICAPCD	Hi-Vol Gravimetric	06-025-1003	(81102)	13694	9	31	-	-	-	8.9	2200
							01	56	-	-	14.3	900
Niland-English Road	ICAPCD	Hi-Vol Gravimetric	06-025-4004	(81102)	13997	-57	31	-	-	-	16.8	2300
		BAM 1020						181	714	1900		
		Hi-Vol Gravimetric					01	173	-	-	22	2000
		BAM 1020						218	915	100		
Westmorland	ICAPCD	Hi-Vol Gravimetric	06-025-4003	(81102)	13697	-43	31	-	-	-	-	-
							01	404	-	-	-	-
RIVERSIDE COUNTY												
Palm Springs Fire Station	SCAQMD	TEOM	06-065-5001	(81102)	33137	174	31	24	33	1300	-	-
							01	13	36	600	-	-
Indio (Jackson St.)	SCAQMD	TEOM	06-065-2002	(81102)	33157	1	31	62	290	1800	-	-
							01	67	227	400	-	-
ARIZONA – YUMA												
Yuma Supersite	ADEQ	TEOM	04-027-8011	(81102)	N/A	60	31	41	93	500	-	-
							01	99	200	1200	-	-

*CARB = California Air Resources Board
*ICAPCD = Air Pollution Control District, Imperial County
*SCAQMD = South Coast Air Management Quality District
*ADEQ =Arizona Department of Environmental Quality

**Time represents the actual time/hour of the measurement in question according to the zone time (PST unless otherwise noted)
October 31, 2014 was not a scheduled sampling day

II.2 Climate

As mentioned above, Imperial County is part of the Colorado Desert, which is a subdivision of the larger Sonoran Desert (**Figure 2-15**) encompassing approximately 7 million acres (28,000 km^2). The desert area encompasses Imperial County and includes parts of San Diego County, Riverside County, and a small part of San Bernardino County.

FIGURE 2-15
SONORAN DESERT REGION

Fig 2-15: Depicts the magnitude of the region known as the Sonoran Desert. Source: Arizona-Sonora Desert Museum at http://desertmuseum.org/center/map.php

The majority of the Colorado Desert lies at a relatively low elevation, below 1,000 feet (300 m), with the lowest point of the desert floor at 275 feet (84 m) below sea level at the Salton Sea. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet (3,000 m), most of the region's mountains do not exceed 3,000 feet (910 m).

In the Colorado Desert (Imperial County), the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect to the northern-most extensions of the East Pacific Rise. Consequently, the region is subject to earthquakes, and the crust is being stretched, resulting in a sinking of the terrain over time.

The Colorado Desert's climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never experiences frost. In addition, the Colorado Desert experiences two rainy seasons per year (in the winter and late summer), especially toward the southern portion of the region which includes a portion of San Diego County. The Colorado Desert portion of San Diego County receives the least amount of precipitation. Borrego Springs, the largest population center within the San Diego desert region averages 5 inches of rain with a high evaporation rate. By contrast, the more northerly Mojave Desert usually has only winter rains.

The west coast Peninsular Ranges, or other west ranges, of Southern California–northern Baja California, block most eastern Pacific coastal air and rains, producing an arid climate. Other short or longer-term weather events can move in from the Gulf of California to the south, and are often active in the summer monsoons. These include remnants of Pacific hurricanes, storms from the southern tropical jet stream, and the northern Inter Tropical Convergence Zone (ITCZ).

The arid nature of the region is demonstrated when historic annual average precipitation levels in Imperial County average 3.11" (**Figure 2-16)**. During the 12-month period prior to October 31 and November 1, 2014, Imperial County recorded total annual precipitation of 1.64 inches. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty winds.

FIGURE 2-16
IMPERIAL COUNTY HISTORICAL WEATHER

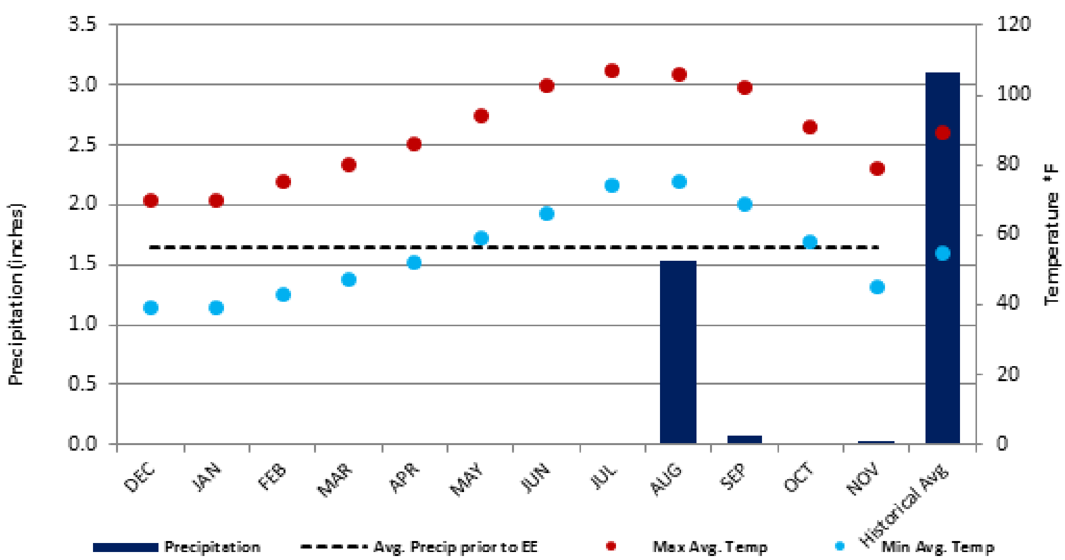

Fig 2-16: in the months prior to October 31, 2014 and November 1, 2014, the region suffered abnormally low total annual precipitation of 1.64 inches. Average annual precipitation is 3.11 inches. Meteorological data courtesy of Western Regional Climate Center (WRCC) and Weather Underground http://www.wrcc.dri.edu/cgi-bin/climain.pl?ca2713

The NWS explains that the speed of any wind resulting from a weather system is directly proportional to the change in air pressure, called a pressure gradient, such that when the pressure gradient increases so does the speed of the wind.[5] Because the pressure gradient is just the difference in pressure between high and low pressure areas, changes in weather patterns may recur seasonally.

Typically, high pressure brings clear skies and with no clouds, there is more incoming shortwave solar radiation causing temperatures to rise. When surface winds become light, the cooling of the air produced directly under a high-pressure system can lead to a buildup of particulates in urban areas under an elongated region of relatively high atmospheric pressure or ridge causing widespread haze. Conversely, a trough is an elongated region of relatively low atmospheric pressure often associated with fronts. Troughs may be at the surface, or aloft under various conditions. Most troughs bring clouds, showers, and a wind shift, particularly following the passage of the trough.

While windblown dust events in Imperial County during the summer monsoon season are often due to outflow winds from thunderstorms, windblown dust events in the fall, winter, and spring are usually due to strong winds associated with low-pressure systems and cold fronts moving southeast across California. These winds are the result of strong surface pressure gradients between the approaching low-pressure system, accompanying cold front, and higher pressure ahead of it. As the low-pressure system and cold front approaches and passes, gusty southwesterly winds typically shift to northwesterly causing variable west winds. These strong winds entrain dust into the atmosphere and transport it over long distances, especially when soils are arid.

II.3 Event Day Summary

The exceptional event for October 31, 2014 and November 1, 2014, caused by a major Pacific trough that approached Northern California Friday, October 31, 2014 then moved down the coast into San Diego pushing a cold front across the region late Friday, October 31, 2014 through Saturday, November 1, 2014.[6] The weather system brought strong gusty westerly winds across southeastern California with the strongest winds and highest gusts, within the mountains passes and desert slopes of San Diego County late Friday October 31, 2014 into Saturday November 1, 2014. On October 31, 2014 and November 1, 2014, strong gusty westerly winds blew across southeastern California as a major winter-like storm passed through the region affecting air quality and causing an exceedance in Brawley, Niland and Westmorland.

Figures 2-17 to 2-21 provide information regarding the expected movement of the winter-like storm and the tightening of the pressure gradients at the surface, which caused the strong gusty westerly winds across southeastern California.

[5] NWS JetStream – Origin of Wind http://www.srh.noaa.gov/jetstream/synoptic/wind.html

[6] Area Forecast Discussion National Weather Service San Diego CA 800 AM PST (900 AM PDT); 100 PM PST (200 PM PDT); 815 PM PST (915 PM PDT) Friday, October 31, 2014 and 309 AM PST (409 PM PDT); 1225 PM PST (125 PM PDT); 758 PM PST (858 PM PDT) Saturday, November 1, 2014

FIGURE 2-17
DAILY FORECAST CHARTS OCTOBER 31, 2014 AND NOVEMBER 1, 2014

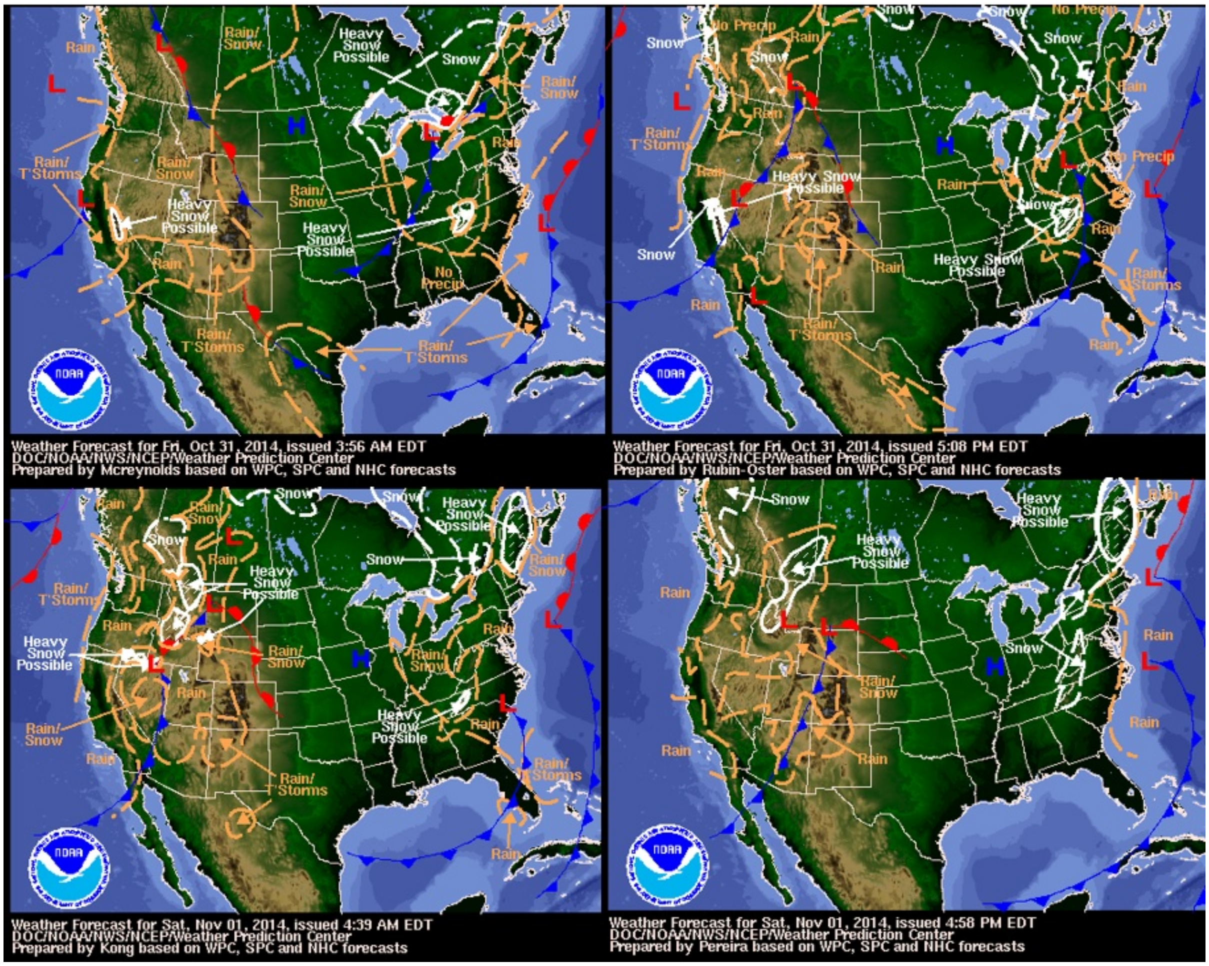

Fig 2-17: A set of daily forecast charts for October 31, 2014 and November 1, 2014. The October 31, 2014 (0056) forecast chart (top left) and afternoon (1408) forecast chart (top right), show the expected path of the front across California. The November 1, 2014 forecast chart bottom left (0139) and bottom right (1358) forecast charts, show the expected path of the frontal system passing through southeastern California. Courtesy of the Weather Prediction Center

FIGURE 2-18
DAILY WEATHER MAPS FOR OCTOBER 31, 2014 AND NOVEMBER 1, 2014

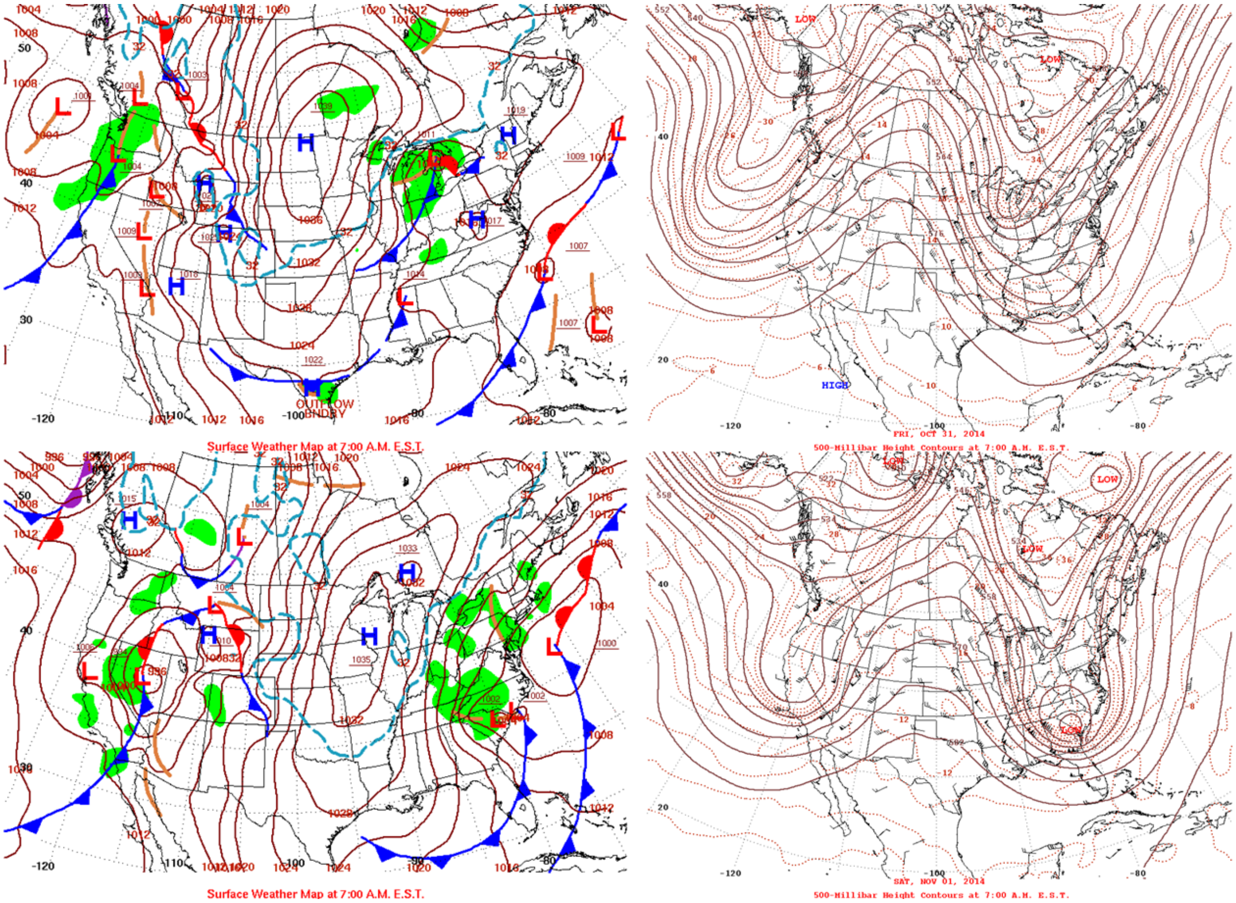

Fig 2-18: Daily weather maps for October 31, 2014 and November 1, 2014, along with 500-millibar height maps for the same day. Both daily weather maps captured at 0400 PST for October 31, 2014 (upper left) and November 1, 2014 (bottom left) shows the trough of low pressure over the California-Nevada-Arizona border and the frontal system sweeping through southeastern California. The upper-level winds drove the weather system over southern California (images to the right). Courtesy of the National Centers for Environmental Prediction, Weather Prediction Center

FIGURE 2-19
SURFACE GRADIENT TIGHTENS OCTOBER 31, 2014

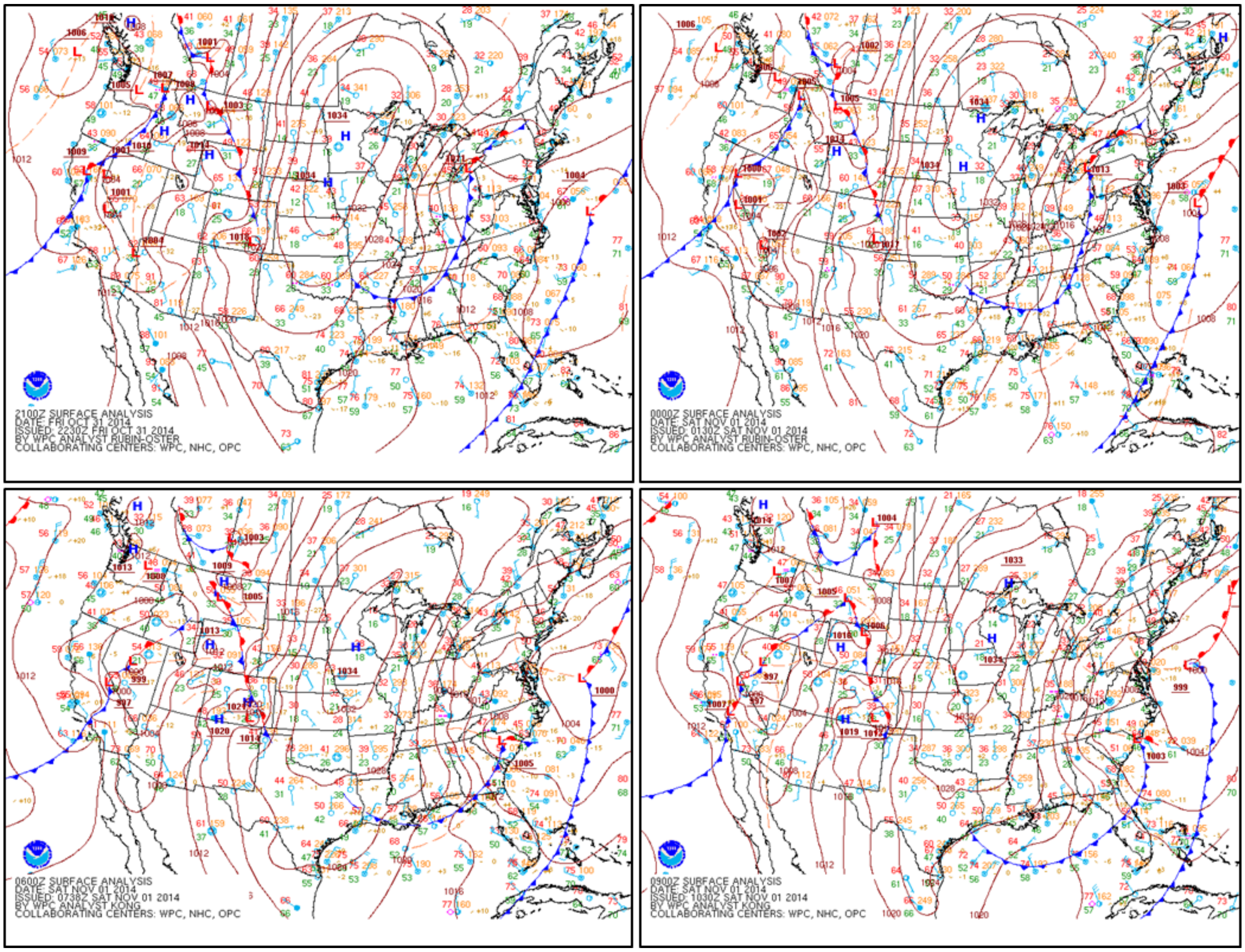

Fig 2-19: As the weather system moved, the surface gradient tightened creating gusty westerly winds across southeastern California. Top two images captured at 1430 PST and 1630 PST, October 31, 2014. Bottom two images captured at 2338 PST October 31, 2014 and 0230 November 1, 2014. Source: Weather Prediction Center Surface Analysis Archive; http://www.wpc.ncep.noaa.gov/archives

FIGURE 2-20
SURFACE GRADIENT TIGHTENS NOVEMBER 1, 2014

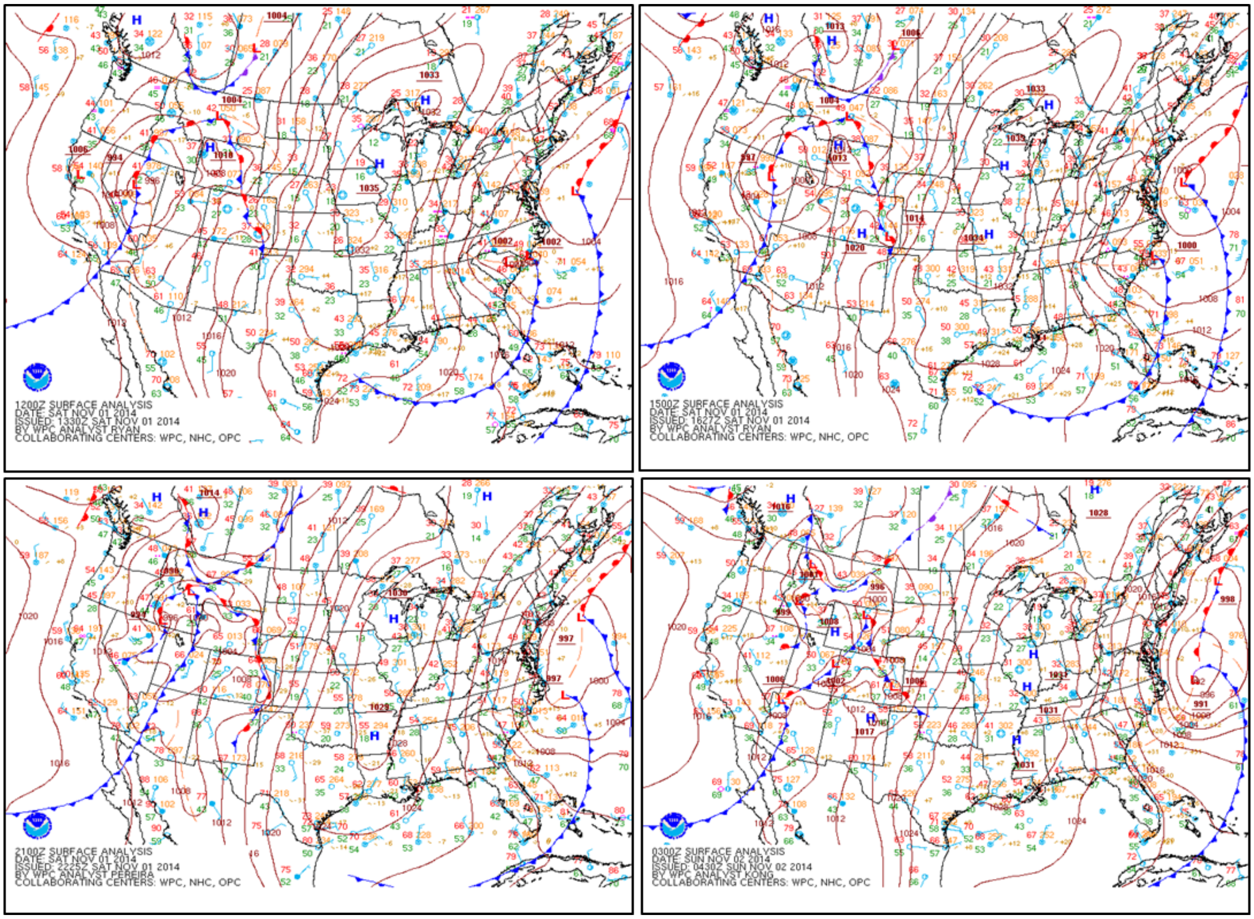

Fig 2-20: As the weather system moved across the region the surface gradient remained moderately packed which continued the gusty westerly winds across southeastern California. Top two images captured at 0530 PST and 0827 PST and bottom two images captured at 1425 PST and 2030 PST on November 1, 2014. Source: Weather Prediction Center Surface Analysis Archive; http://www.wpc.ncep.noaa.gov/archives

FIGURE 2-21
GOES W VISIBLE INFRARED SATELLITE IMAGES
OCTOBER 31, 2014 AND NOVEMBER 1, 2014

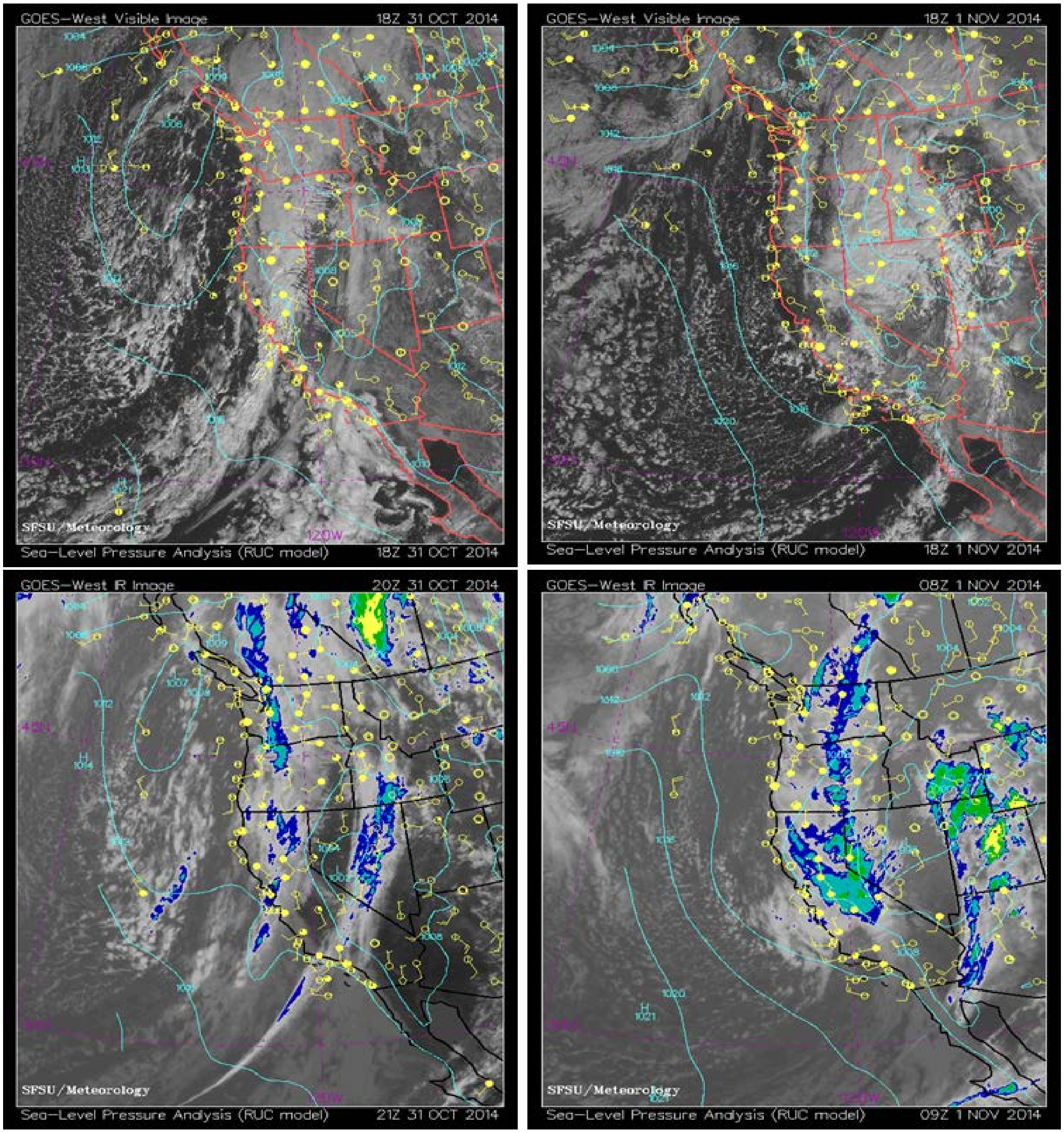

Fig 2-21: Visible and infrared sea level pressure analysis images captured by a GOES-W satellite on October 31, 2014 and November 1, 2014. The two top visible images captured at 1000 PST on October 31, 2014 and November 1, 2014 illustrate the movement of the storm system from off the southern California coast inland. The two bottom infrared images captured at 1300 PST October 31, 2014 and at 0100 PST November 1, 2014 depict strong southwesterly winds of at least 23 mph over southeastern California. Courtesy of SFSU Department of Earth and Climate Sciences and the California Regional Weather Server ; http://squall.sfsu.edu/crws/archive/wcsathts_arch.html

As early as Tuesday, October 28, 2014 the San Diego NWS office discussed the approaching trough onto the west coast and forecasted the potential increase and shift of winds Friday, October 31, 2014 during the evening hours.[7] By Wednesday, October 29, 2014, the Area Forecast discussions issued by the San Diego NWS discussed the increase of the Onshore Flow for Thursday, October 30, 2014 through Friday, October 31, 2014 and the movement of the low-pressure system inland across California Friday night and Saturday, November 1, 2014.[8] Essentially, the San Diego NWS office described a pattern change for Friday October 31, 2014 through Saturday, November 1, 2014 from an easterly flow to a westerly flow when the existing upper-level high pressure weakened and the onshore flow returned. Consequently, the San Diego NWS office issued its first of nine Urgent Weather Messages at 1252pm PST for major Mountain and desert areas including the San Diego Mountains and deserts. The Urgent Weather Message contained a wind advisory effective 700pm PST through 400pm PST Saturday, extended to 200am Sunday, November 2, 2014 during the issued advisory Saturday November 1, 2014.[9] All the issued wind advisories included forecast west to southwest winds 25 to 35mph, gusts up to 55mph and higher in prone areas. Areas identified included mountain ridges, desert slopes, adjacent desert areas, Interstate 10 and Interstate 8. Finally, identified impacts included reduced visibility due to blowing sand and in higher elevations reduced visibility due to blowing snow.

Similarly, by Wednesday, October 29, 2014 the Phoenix NWS office acknowledged the expected movement of a strong dry cold front into Arizona by Saturday bringing cooler temperatures and breezy conditions. The primary issued area discussions by the Phoenix NWS office confirmed the movement of the low-pressure trough and the gusty westerly winds along the mountain ridges and passes. Consequently, the Phoenix NWS office issued a single Special Weather Statement for early morning in Imperial and El Centro Saturday November 1, 2014 identifying strong gusty southwest winds.

Locally, both the Imperial County Airport (KIPL) and the Naval Air Facility (KNJK) measured elevated winds and gusts as early as the late evening hours of October 31, 2014 through November 1, 2014. Measured winds ranged from 11mph to 44mph while measured gusts ranged from 25mph to 53mph. KNJK measured consistently higher winds speeds and gusts October 31, 2014 and November 1, 2014 than KIPL.

Figures 2-22 and 2-23 are graphical illustrations of the chain of events for October 31, 2014 and November 1, 2014.

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[7] Area Forecast Discussion National Weather Service San Diego CA 815 PM PST (915 PM PDT) Tuesday, October 28, 2014

[8] Area Forecast Discussion National Weather Service San Diego CA 325 AM PST (425 AM PDT); 828 AM PST (928 AM PDT); 1214 PM PST (114 PM PST); 810 PM PST (910 PM PDT) Wednesday, October 29, 2014

[9]A wind advisory is issued when the following conditions are expected 1) sustained winds of 31 to 39 mph for an hour or more and/or 2) wind gusts of 46 to 57 mph for any duration. https://www.weather.gov/lwx/WarningsDefined Issuance is normally site specific

FIGURE 2-22
RAMP UP ANALYSIS FOR OCTOBER 31, 2014

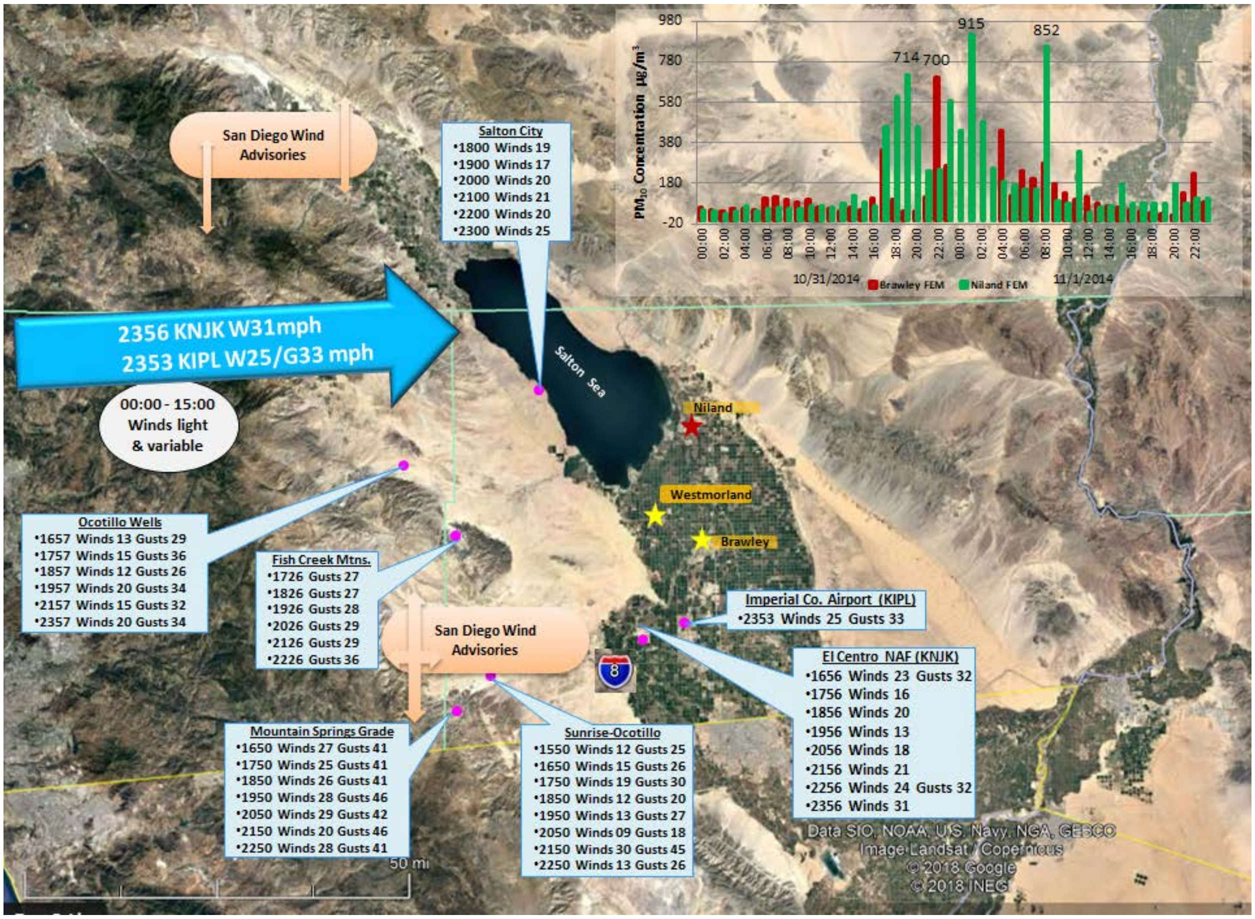


Fig 2-22: The graphic shows key moments in the ramp-up leading to the exceedance on October 31, 2014. Winds are light and variable prior to 1600 PST. Increases in winds and gusts are coincident with westerly winds in the afternoon to the evening hours after 1600 PST. Wind data from KNJK and KIPL from the NCEI's QCLCD system. Air quality data is from the EPA's AQS data bank. Google Earth base map

FIGURE 2-23
RAMP UP ANALYSIS FOR NOVEMBER 1, 2014

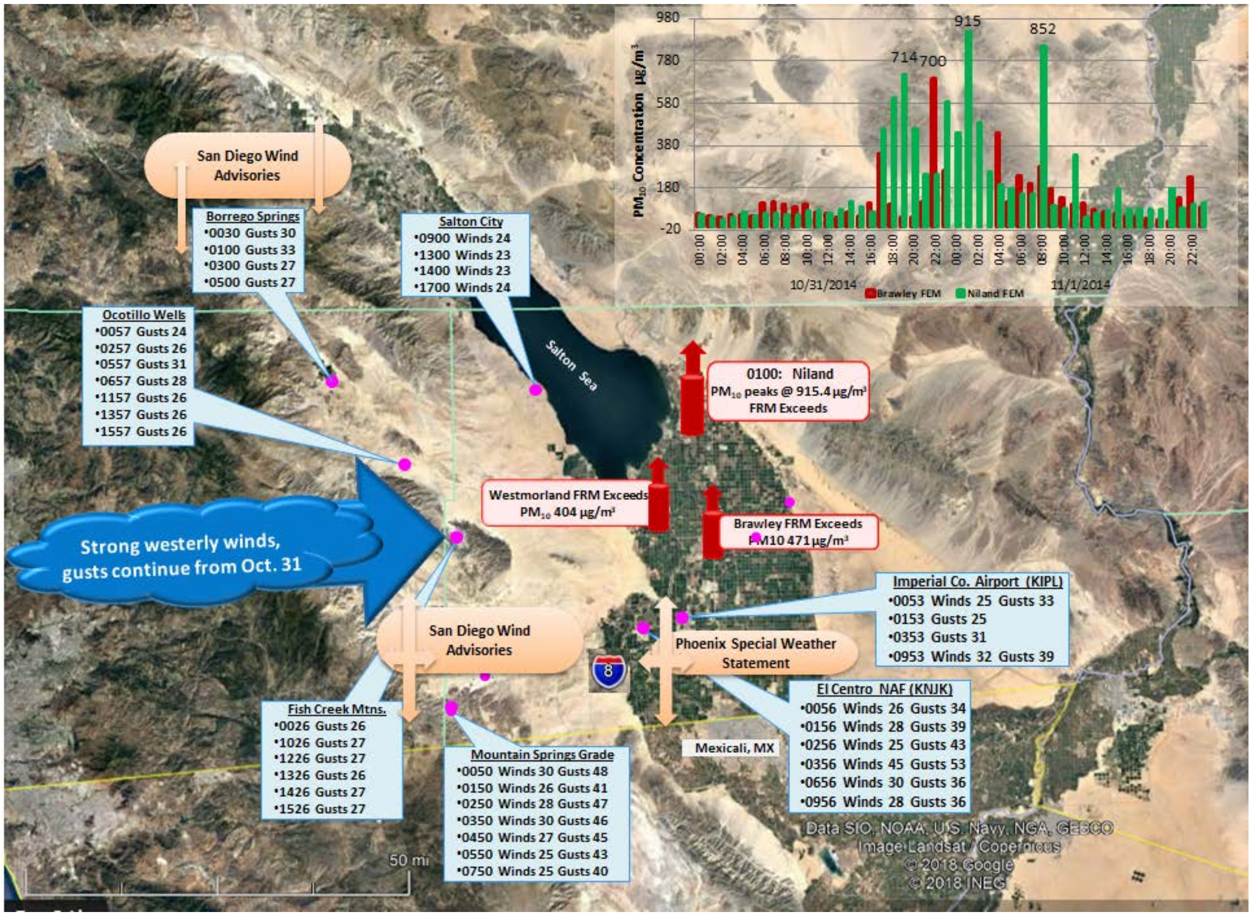


Fig 2-23: The graphic shows key moments in the ramp-up leading to the exceedance by the monitors located within the northern portion of Imperial Count on November 1, 2014. The strongest winds and gusts commenced during the late evening hours of October 31, 2014 through November 1, 2014. Both KNJK and KIPL measured winds above the 25 mph threshold. Google Earth base map

Table 2-2 contains a summary of maximum winds, peak wind gusts, and wind direction at monitors in Imperial County, eastern Riverside County, Yuma County, Arizona, and Mexicali. For detailed meteorological station, graphs see **Appendix B**.

TABLE 2-2
WIND SPEEDS ON OCTOBER 31, 2014 AND NOVEMBER 1, 2014

Station Monitor Airport Meteorological Data	Day	Maximum Wind Speed (WS) (mph)	Wind Direction during Max WS (degrees)	Time of Max Wind Speed	24 hr Maximum Wind Gust (WG) (mph)	Time of Max WG	PM_{10} correlated to time of Max Wind Speed Brly	PM_{10} correlated to time of Max Wind Speed Nlnd
IMPERIAL COUNTY								
Imperial Airport (KIPL)	31	25	250	2353	33	2300	264	585
	1	32	250	953	39	953	177	95
Naval Air Facility (KNJK)	31	31	240	2356	32	1656/2256	264	585
	1	45	240	356	53	356	-	255
Calexico (Ethel St)	31	9.8	272	2300	-	-	264	585
	1	16.7	288	1300	-	-	79	59
El Centro (9th Street)	31	8.9	273	2200	-	-	700	245
	1	14.3	256	900	-	-	177	95
Niland (English Rd)	31	16.8	257	2300	-	-	264	585
	1	22	264	2000	-	-	23	177
RIVERSIDE COUNTY								
Blythe Airport (KBLH)	31	24	230	2352	21	1252	264	585
	1	24	220	1252	34	1152	111	38
Palm Springs Airport (KPSP)	31	22	320	1753	33	2353	342	456
	1	2	330	1653	26	1214	46	80
Jacqueline Cochran Regional Airport (KTRM) - Thermal	31	15	340	1852	-	-	102	603
	1	28	280	811	40	849	278	852
ARIZONA - YUMA								
Yuma MCAS (KNYL)*MST	31	17	190	1557	-	-	107	65
	1	16	300	1557/1657	24	2157	46	80
MEXICALI - MEXICO								
Mexicali Int. Airport (MXL)	31	13.8	130	1542	-	-	47	90
	1	23	300	1441	-	-	67	70

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted

National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory HYSPLIT back trajectory models [10] **Figures 2-24 and 2-25** illustrate the path of airflow six hours and twelve hours prior to reaching air monitors October 31, 2014 and November 1, 2014, respectively. Elevated wind speeds and concentrations commenced as early as 1600 PST October 31, 2014 and continued primarily through the morning hours of November 1, 2014. Both figures illustrate a typical scenario when west winds (airflow) blow through the mountain passes, many times increasing in speed, and down the desert slopes of San Diego County onto the valley floor. Strong

[10] The Hybrid Single Particle Lagrangian Integrated Trajectory Model (**HYSPLIT**) is a computer model that is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. It is currently used to compute air parcel trajectories and dispersion or deposition of atmospheric pollutants. One popular use of HYSPLIT is to establish whether high levels of air pollution at one location are caused by transport of air contaminants from another location. HYSPLIT's back trajectories, combined with satellite images (for example, from NASA's MODIS satellites), can provide insight into whether high air pollution levels are caused by local air pollution sources or whether an air pollution problem was blown in on the wind The initial development was a result of a joint effort between NOAA and Australia's Bureau of Meteorology. Source: NOAA/Air Resources Laboratory, 2011.

westerly winds typically blow through thee mountain passes and desert slopes transporting windblown dust across the desert floor and agricultural lands within Imperial County. It is of some worth to point out that from time to time modeled winds differ from local conditions. Data used in the HYSPLIT model has a horizontal resolution of 12 km and integrated every three hours. Thus, the HYSPLIT model may differ from local observed surface wind speeds and directions.

FIGURES 2-24
HYSPLIT MODEL FOR OCTOBER 31, 2014

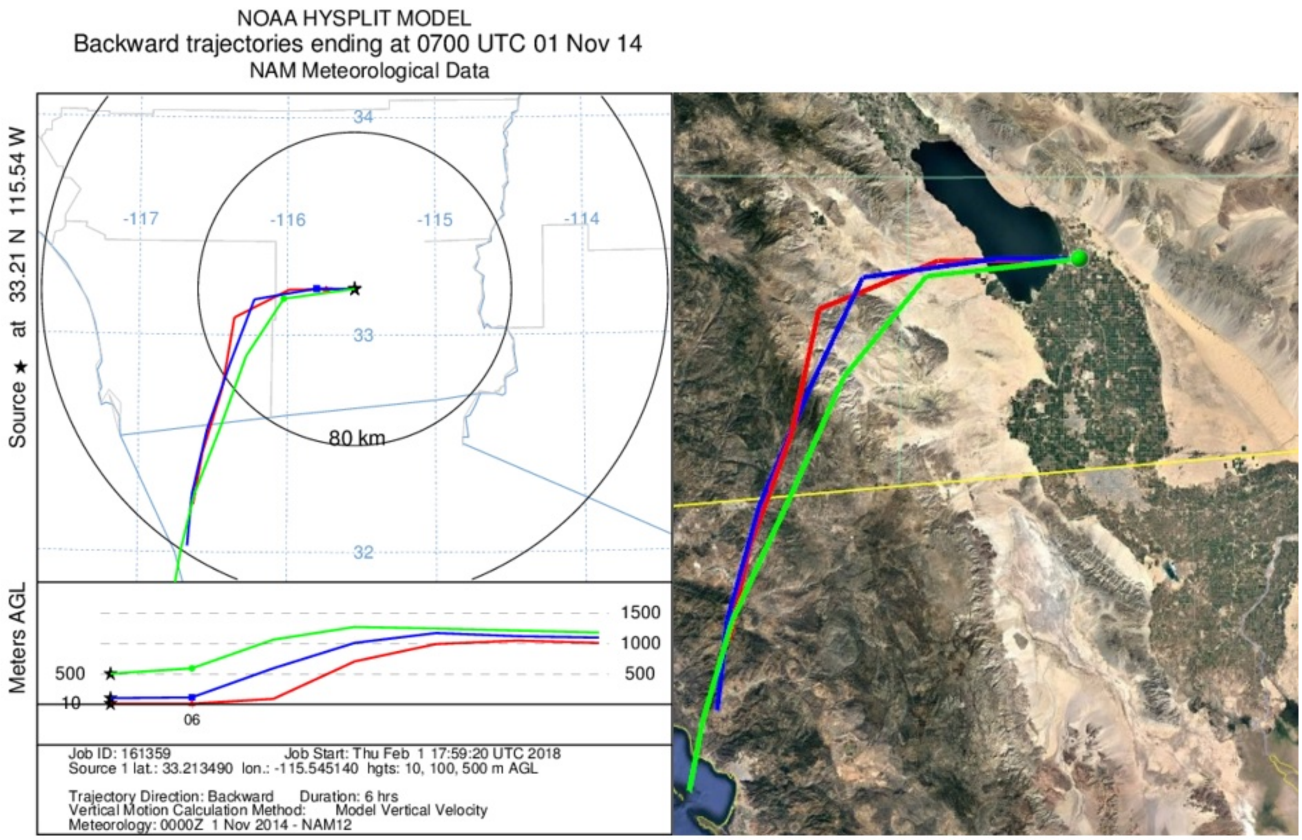


Fig 2-24: The HYSPLIT back-trajectory illustrates the path of airflow in the six hours prior to reaching Niland at 2300 PST on October 31, 2014. This is coincident with the elevated winds speeds measured at the NAF (KNJK) and the elevated measured concentrations at the Niland monitor. Red lines indicate airflow at 10 meters AGL (above ground level); blue=100m; green=500m. HYSPLIT model generated through NOAA's Air Resources Laboratory. Aqua lines are county lines. Yellow line is the international border. Google base map

Figure 2-24 illustrates the path of the windblown dust for six hours up to 2300 PST coincident with elevated wind speeds and concentrations at the Niland monitor on October 31, 2014. **Figure 2-25** illustrates the path of the continued elevated winds and gust, which transported windblown dust affecting air monitors located within the northern portion of the Imperial County on November 1, 2014.

FIGURES 2-25
HYSPLIT MODEL FOR NOVEMBER 1, 2014

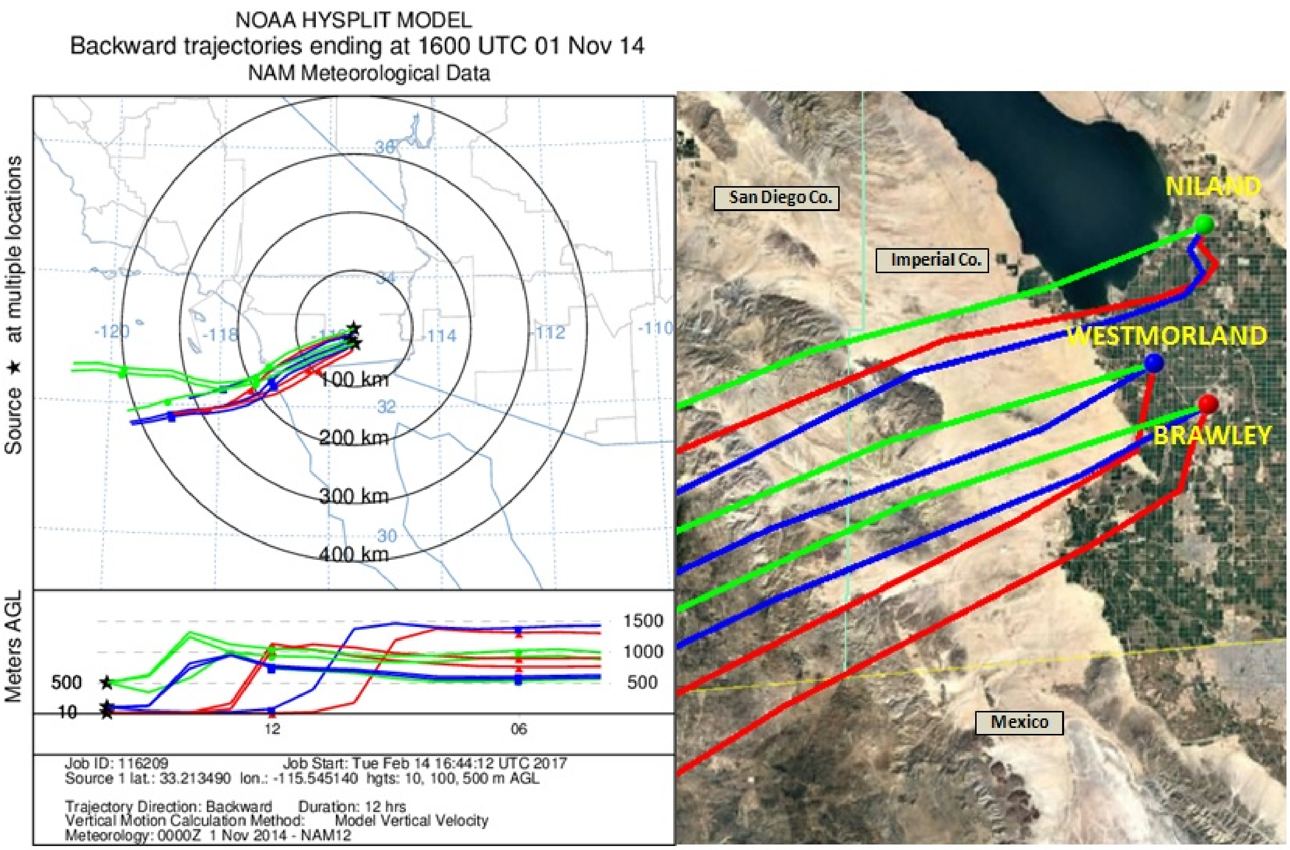


Fig 2-25: The HYSPLIT back trajectory (ending at 0800 PST) illustrates the path of airflow that transported windblown dust affecting the air monitors located within the northern portion of the Imperial County. While the ending hour of 0800PST is coincident with the final hour in which the Niland monitor last measured an elevated concentration the Brawley monitor continued to measure elevated concentrations through 1200pm PST. Elevated wind speeds and gusts commenced as early as the evening hours of October 31, 2014 and continued through November 1, 2014. Red lines indicate airflow at 10 meters AGL (above ground level); blue=100m; green=500m. HYSPLIT model generated through NOAA's Air Resources Laboratory

Figures 2-26 and 2-27 illustrate the elevated wind speeds and elevated levels of hourly PM_{10} concentrations measured in Riverside, Imperial and Yuma counties for a total of four days, October 30, 2014 through November 2, 2014. Elevated emissions entrained into Imperial County affected the Brawley, Niland and Westmorland monitors when gusty west winds, associated with the passage of a low-pressure system, passed through Imperial County October 31, 2014 through November 1, 2014.

The Brawley and Niland monitors measured the highest elevated concentrations on October 31, 2014 between 1700 PST and 2300 PST coincident with continual measured wind speeds and gusts at or above 25 mph. On November 1, 2014, the Brawley and Niland monitors measured the highest elevated concentrations between 0000 PST and 1200 PST coincident with continual measured wind speeds and gusts at or above 25 mph.

The resulting entrained dust and accompanying high winds from the system qualify this event as a "high wind dust event".[11] High wind dust events are considered natural events where the windblown dust is either from solely a natural source or from areas where anthropogenic sources of windblown dust are controlled with Best Available Control Measures (BACM). The following sections provide evidence that the October 31, 2015 and November 1, 2014 high wind event qualifies as a natural event and that BACM was overwhelmed by the suddenness and intensity of the meteorological event.

FIGURE 2-26
96 HOUR PM_{10} CONCENTRATIONS AT REGIONAL STATIONS

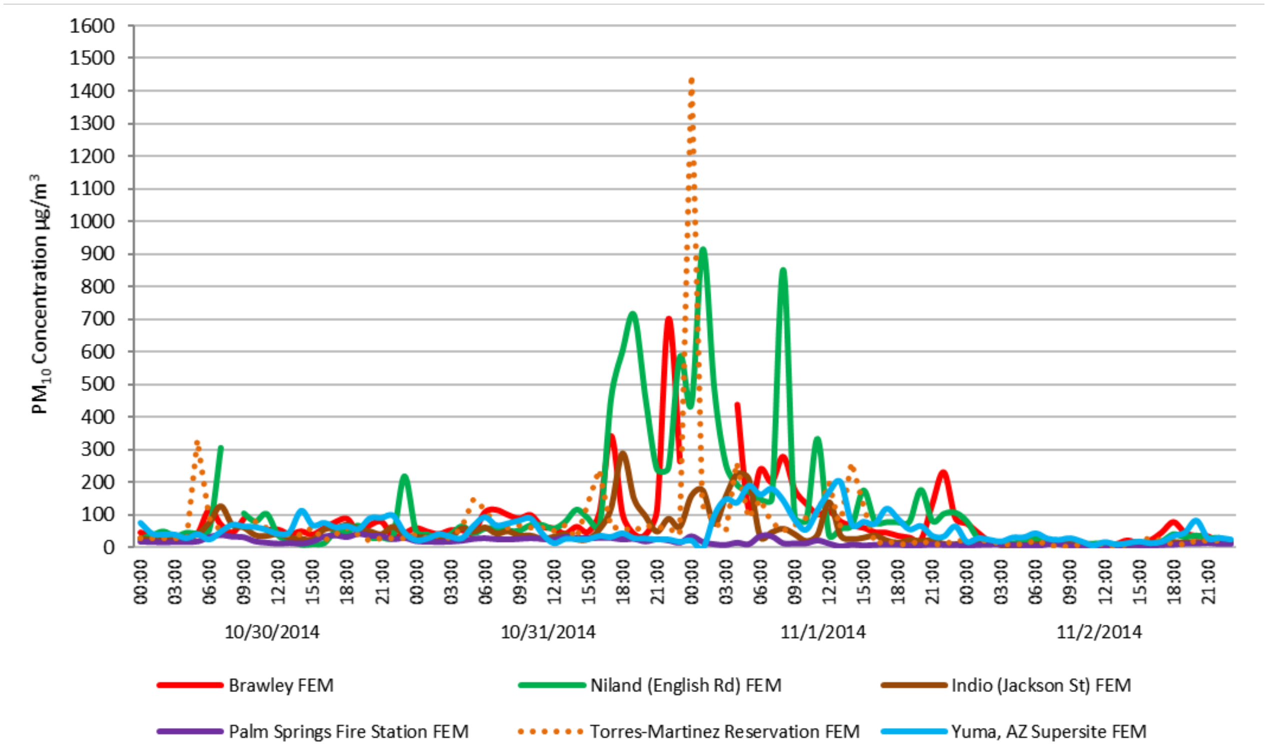


Fig 2-26: Is the graphical representation of the 96-hour relative PM_{10} concentrations at regional monitoring locations throughout Riverside, Imperial and Yuma counties. The elevated measured PM_{10} concentrations at air monitoring sites on October 31, 2014 and November 1, 2014 demonstrate the regional impact of the weather system and accompanying winds. Air quality data is from the EPA's AQS data bank

[11] Title 40 Code of Federal Regulations part 50: §50.1(p) High wind dust event is an event that includes the high-speed wind and the dust that the wind entrains and transports to a monitoring site.

FIGURE 2-27
96 HOUR WIND SPEEDS AT REGIONAL AIRPORTS

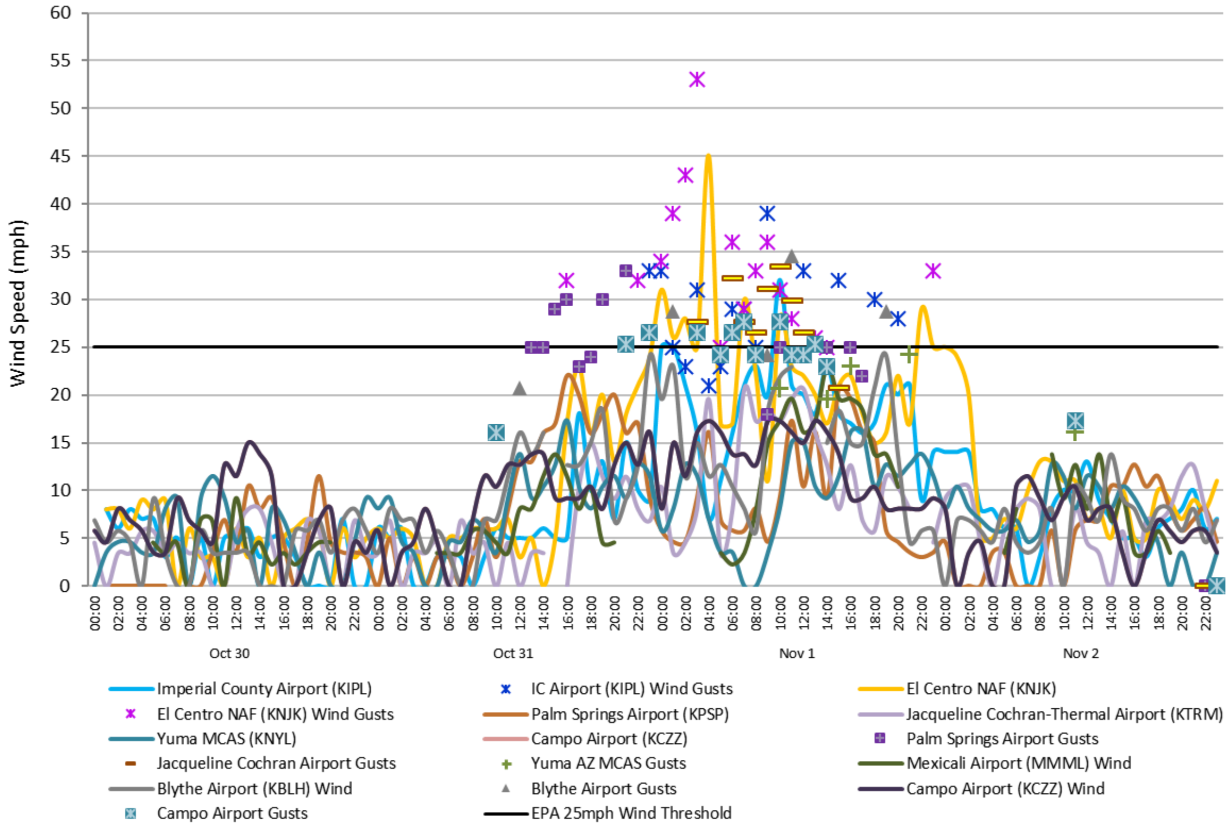


Fig 2-27: Is the graphical representation of the 96 hour measured winds speeds and gusts at various sites including regional airports in California and Arizona. The graph illustrates the significant number of hours where measured wind speeds and wind gusts where above 25 mph at El Centro NAF. All the sites depicted experienced elevated winds on October 31, 2014 and November 1, 2014. Wind Data from the NCEI's QCLCD system

III Historical Concentrations

III.1 Analysis

While naturally occurring high wind events may recur seasonally and at times frequently and qualify for exclusion under the EER, historical comparisons of the particulate concentrations and associated winds provide insight into the frequency of events within an identified area. The following time series plots illustrate that PM_{10} concentrations measured at the Brawley, Niland and Westmorland monitors on October 31, 2014 and November 1, 2014, compared to non-event and event days demonstrates the variability over several years and seasons. The analysis also provides supporting evidence that there exists a clear causal relationship between the October 1, 2014 and November 1, 2014 high wind event and the exceedance measured at the Brawley, Niland and Westmorland monitors.

Figures 3-1 through 3-8 show the time series of available FRM and BAM 24-hr PM_{10} concentrations at the Brawley, Niland and Westmorland monitors for the period of January 1, 2010 through November 1, 2014. Note that prior to 2013, BAM data was not FEM therefore, not reported into AQS.[12] Properly establishing the variability of the event as it occurred on October 31, 2014 and on November 1, 2014, 24-hour averaged PM_{10} concentrations were compiled and plotted as a time series. All figures illustrate that the exceedance, which occurred on October 31, 2014 and November 1, 2014 were outside the normal historical concentrations when compared to event and non-event days. Air quality data for all graphs obtained through the EPA's AQS data bank.

[12] Pollutant concentration data contained in EPA's Air Quality System (AQS) are required to be reported in units corrected to standard temperature and pressure (25 C, 760 mm Hg). Because the PM_{10} concentrations prior to 2013 were not reported into the AQS database all BAM (FEM) data prior to 2013 within this report are expressed as micrograms per cubic meter (mg/m3) at local temperature and pressure (LTP) as opposed to standard temperature and pressure (STP, 760 torr and 25 C). The difference in concentration measurements between standard conditions and local conditions is insignificant and does not alter or cause any significant changes in conclusions to comparisons of PM_{10} concentrations to PM_{10} concentrations with in this demonstration.

FIGURE 3-1
BRAWLEY HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO NOVEMBER 1, 2014

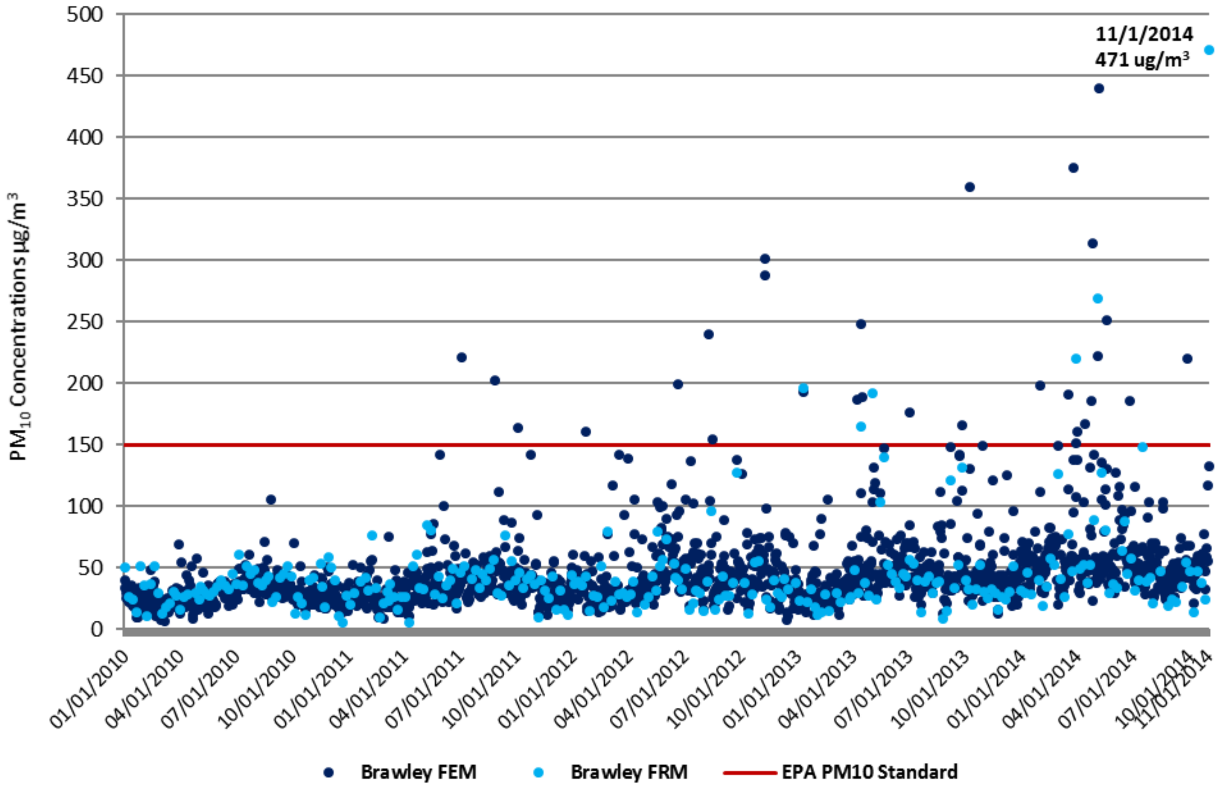


Fig 3-1: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 471 µg/m^3 on November 1, 2014 by the Brawley monitor was outside the normal historical concentrations when compared to similar event days and non-event days. Of the 1,766 sampling days there were 27 exceedance days which is less than a 2.0% occurrence rate

FIGURE 3-2
NILAND HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO NOVEMBER 1, 2014

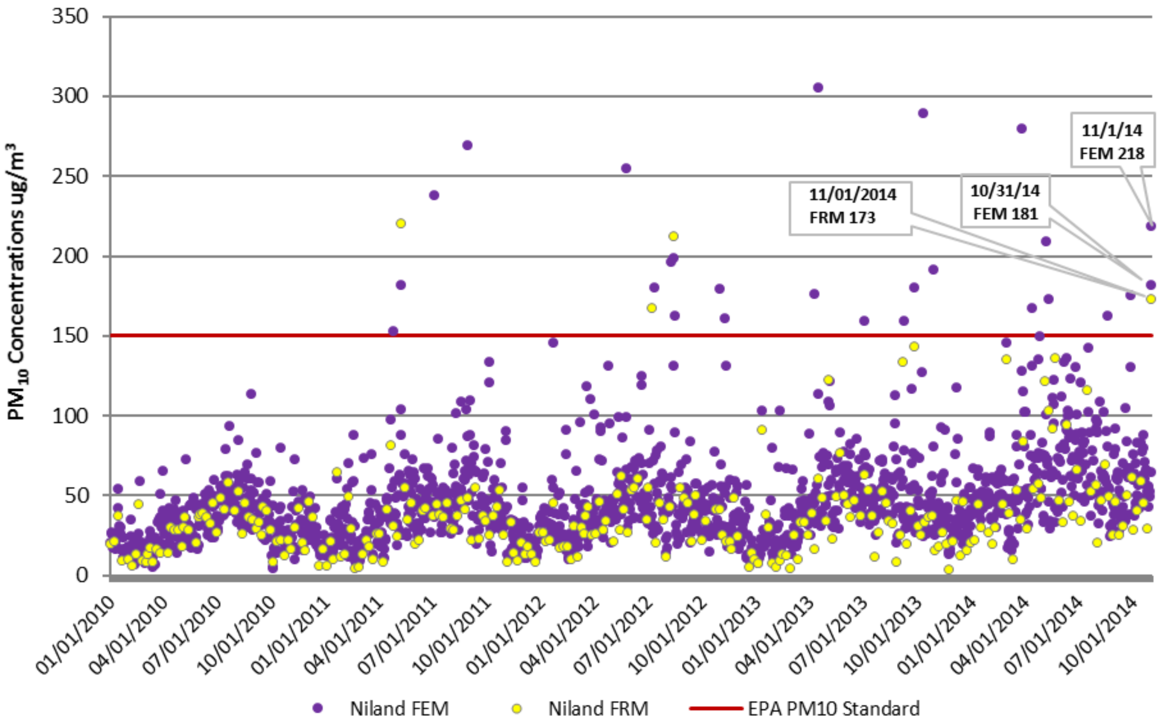


Fig 3-2: A comparison of PM_{10} historical concentrations demonstrates that the measured concentrations of 181 µg/m^3, 173 µg/m^3 and 218 µg/m^3 on October 31, 2014 and November 1, 2014 by the Niland monitor was outside the normal historical concentrations when compared to similar event days and non-event days. Of the 1,766 sampling days there were 27 exceedance days which is less than a 2.0% occurrence rate

FIGURE 3-3
WESTMORLAND HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO NOVEMBER 1, 2014

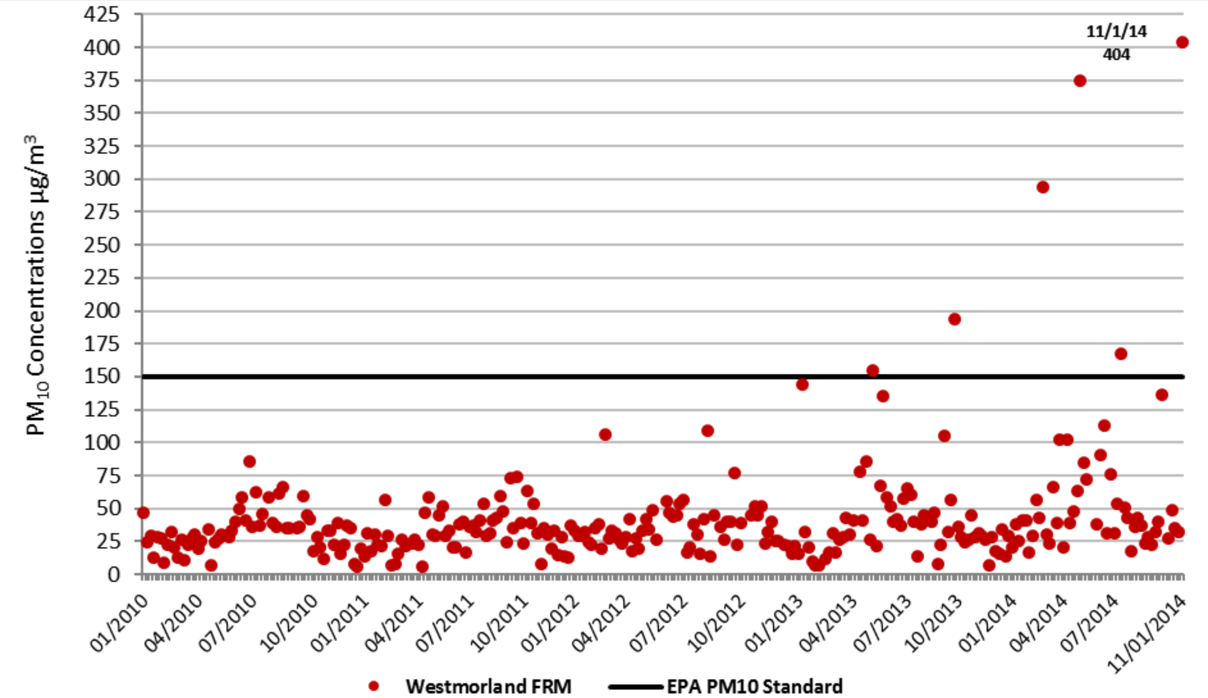


Fig 3-3: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 404 µg/m^3 on November 1, 2014 by the Westmorland monitor was outside the normal historical concentrations when compared to similar event days and non-event days. Of the 1,766 sampling days there were 27 exceedance days which is less than a 2.0% occurrence rate

FIGURE 3-4
BRAWLEY, NILAND AND WESTMORLAND HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO NOVEMBER 1, 2014

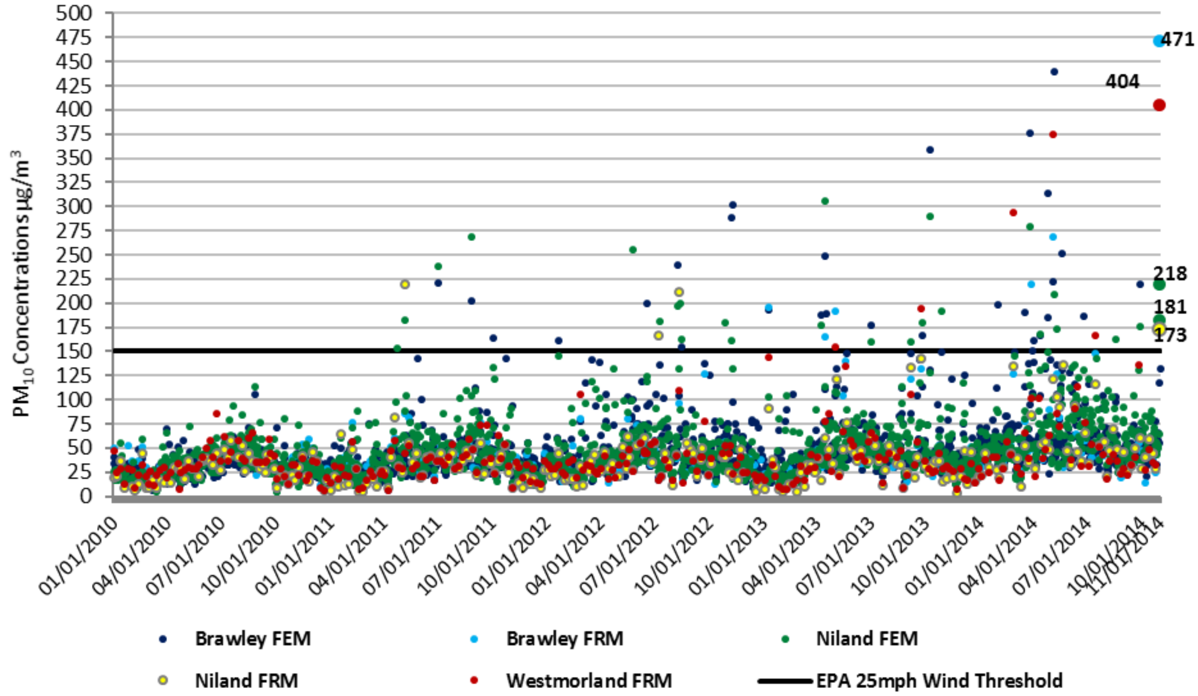
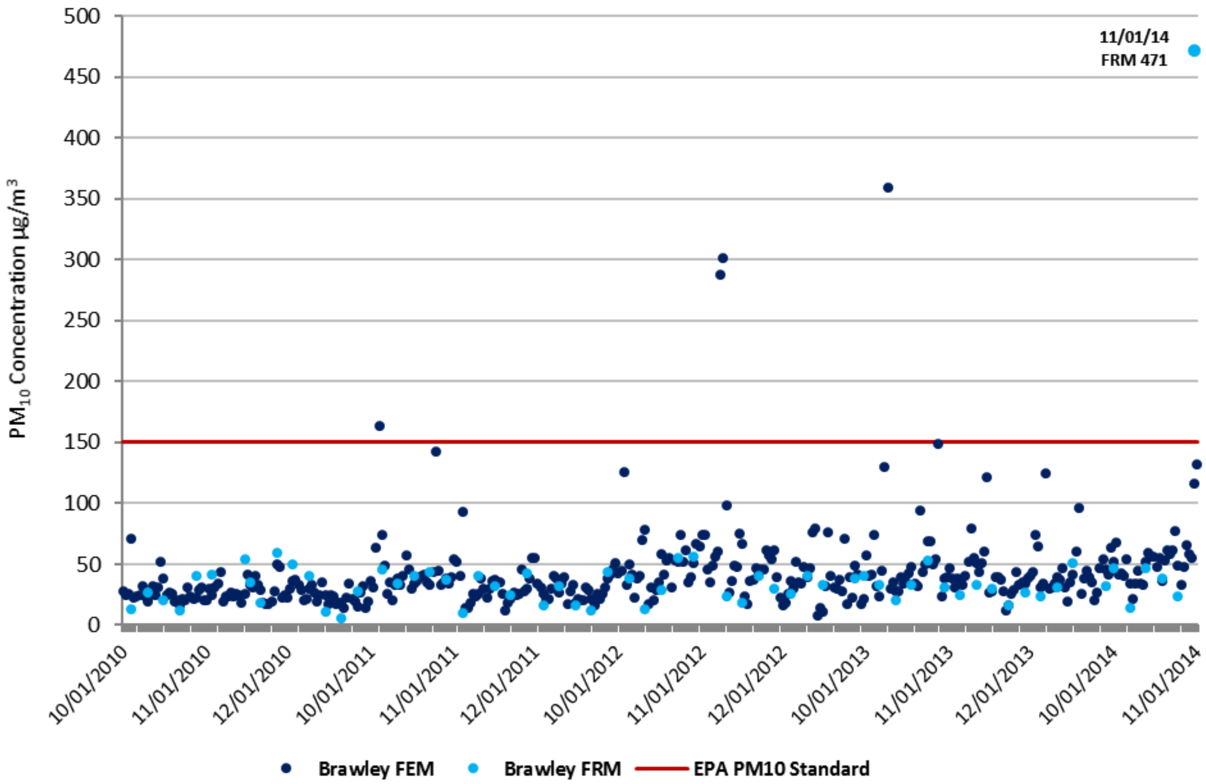


Fig 3-4: A comparison of PM_{10} historical concentrations demonstrates that the measured concentrations of 181 µg/m^3, 471 µg/m^3, 173 µg/m^3, 218 µg/m^3 and 404 µg/m^3 on October 31, 2014 and November 1, 2014 by the Brawley, Niland and Westmorland monitors was outside the normal historical concentrations when compared to similar event days and non-event days. Of the 1,766 sampling days there were 27 exceedance days which is less than a 2.0% occurrence rate

The time series, **Figure 3-4**, for Brawley, Niland and Westmorland included 2,041 credible samples, measured between January 1, 2010 and November 1, 2014.

Overall, the time series illustrates that the Brawley, Niland and Westmorland monitors, measured 27 exceedance days out of the 1,766 sampling days, which is less than a 2.0% occurrence rate. Of the 27 measured exceedance days, six (6) exceedance days occurred during the fourth quarter (October – December). The remaining 21 exceedance days occurred during the first, second, and third quarters. The October 31, 2014 and November 1, 2014 concentrations are outside the normal historical measurements for the fourth quarter. No exceedances of the standard occurred during 2010. As mentioned above, FEM BAM data was not regulatory from 2010 to 2012.

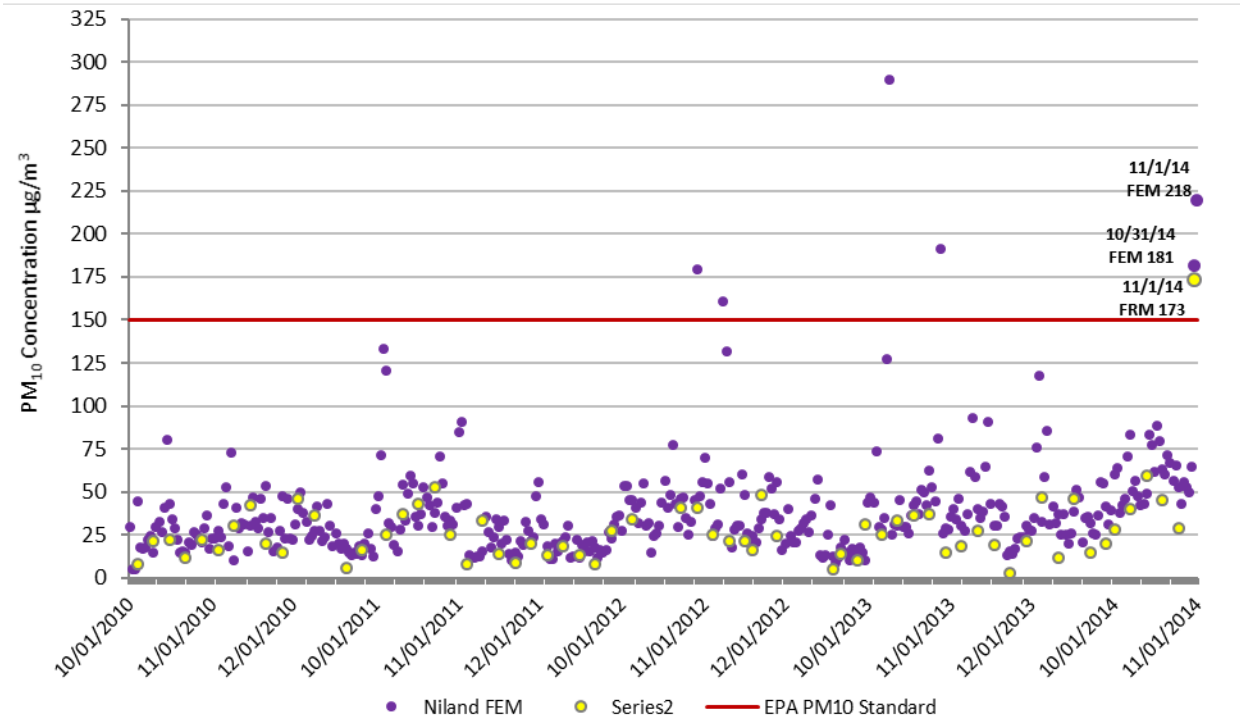
FIGURE 3-5
BRAWLEY SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH NOVEMBER 1, 2014**



***Quarterly; October 1, 2010 to December 31, 2013 and October 1, 2014 to November 1, 2014**

Fig 3-5: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 471 µg/m^3 by the Brawley monitor on November 1, 2014 was outside the normal seasonal concentrations when compared to similar days and non-event days

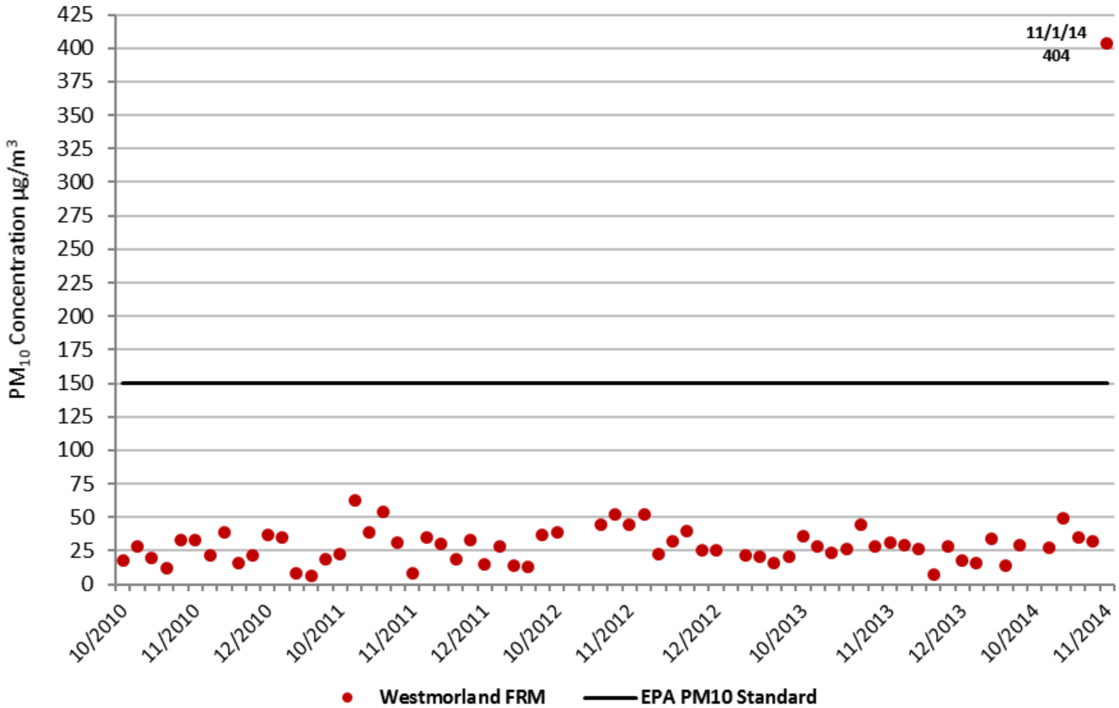
FIGURE 3-6
NILAND SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH NOVEMBER 1, 2014**



***Quarterly; October 1, 2010 to December 31, 2013 and October 1, 2014 to November 1, 2014**

Fig 3-6: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentrations of 181 µg/m^3, 173 µg/m^3 and 218 µg/m^3 on October 31, 2014 and November 1, 2014 by the Niland monitor was outside the normal seasonal concentrations when compared to similar days and non-event days

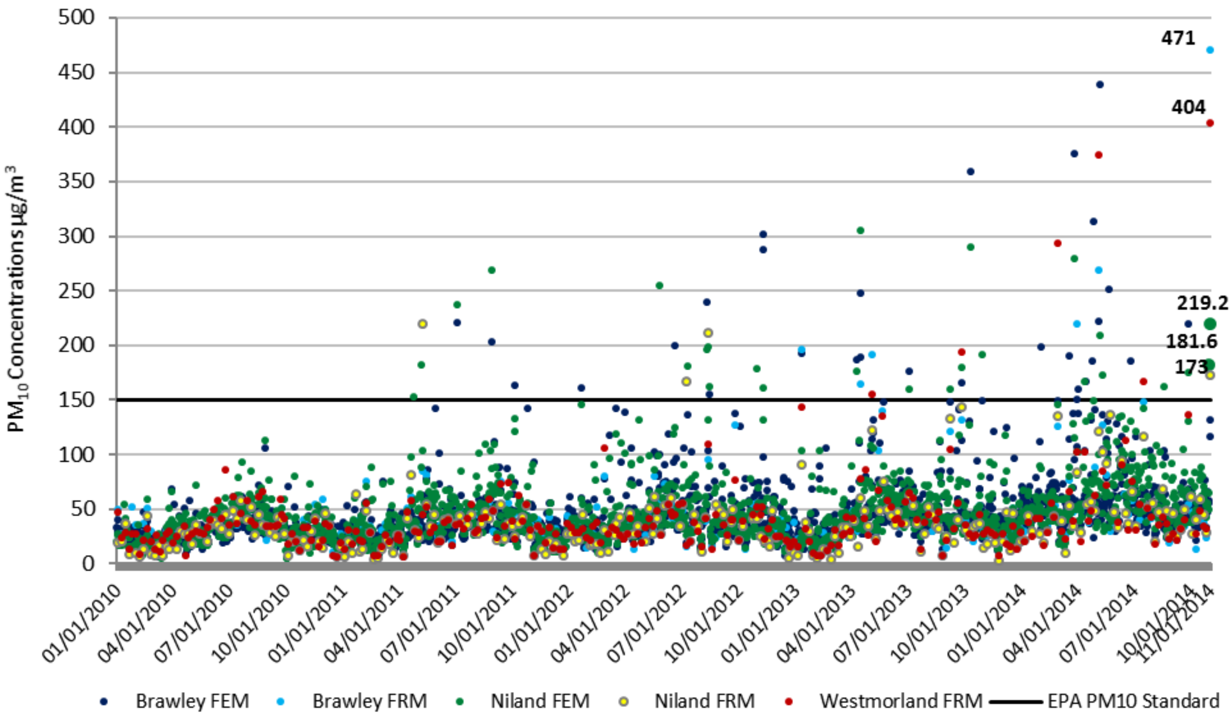
FIGURE 3-7
WESTMORLAND SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH NOVEMBER 1, 2014**



***Quarterly; October 1, 2010 to December 31, 2013 and October 1, 2014 to November 1, 2014**

Fig 3-7: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 404 µg/m^3 on November 1, 2014 by the Westmorland monitor was outside the normal seasonal concentrations when compared to similar days and non-event days

FIGURE 3-8
BRAWLEY, NILAND AND WESTMORLAND SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH NOVEMBER 1, 2014**



***Quarterly; October 1, 2010 to December 31, 2013 and October 1, 2014 to November 1, 2014**

Fig 3-8: A comparison of PM_{10} seasonal concentrations demonstrates that the measured concentrations of 181 µg/m^3, 471 µg/m^3, 173 µg/m^3, 218 µg/m^3 and 404 µg/m^3 on October 31, 2014 and November 1, 2014 by the Brawley, Niland and Westmorland monitors were outside the normal seasonal concentrations when compared to similar days and non-event days

FIGURE 3-9
BRAWLEY, NILAND AND WESTMORLAND HISTORICAL FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS JANUARY 1, 2010 TO NOVEMBER 1, 2014

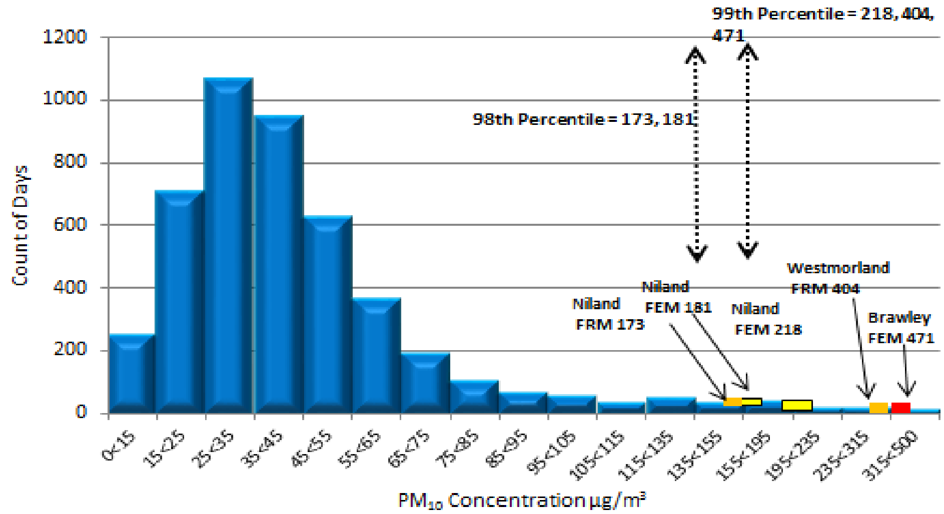


Fig 3-9: The 24-hr average PM_{10} concentrations measured at the Brawley, Niland and Westmorland monitors on October 31, 2014 and November 1, 2014 were in excess of the 98th percentile

FIGURE 3-10
BRAWLEY, NILAND AND WESTMORLAND SEASONAL FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS OCTOBER 1, 2010 TO DECEMBER 31, 2014

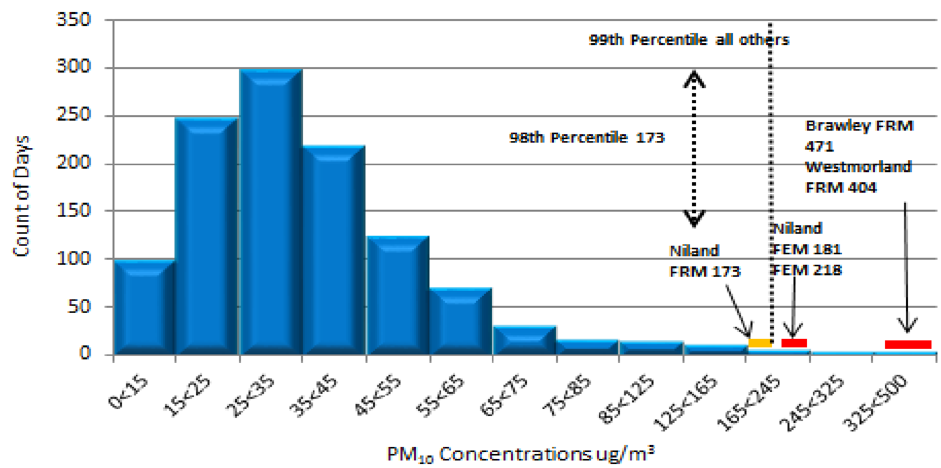


Fig 3-10: The 24-hr average PM_{10} concentrations at the Brawley, Niland and Westmorland monitors on October 31, 2014 and November 1, 2014 were in excess of the 98th percentile

For the combined FRM and FEM data sets for the Brawley, Niland and Westmorland monitors the annual historical and the seasonal historical PM_{10} concentrations of 181 µg/m^3, 471 µg/m^3, 173 µg/m^3, 218 µg/m^3, and 404 µg/m^3 are above the 98th percentile ranking. Looking at the annual time series concentrations, the seasonal time series concentrations and the percentile rankings for both the historical and seasonal patterns the October 31, 2014 and November 1, 2014 measured exceedances are clearly outside the normal concentration levels when comparing to non-event days and event days.

III.2 Summary

The information provided, above, by the time series plots, seasonal time series plots, and the percentile rankings illustrate that the PM_{10} concentration observed on October 31, 2014 and November 1, 2014 occurred infrequently. When comparing the measured PM_{10} level on October 31, 2014 and November 1, 2014 and following USEPA EER guidance, this demonstration provides supporting evidence that the measured exceedance measured at the Brawley, Niland and Westmorland monitors were outside the normal historical and seasonal historical concentration levels.

The historical concentration analysis provided here supports the determination that the October 31, 2014 and November 1, 2014 natural event affected the concentration levels at the Brawley, Niland and Westmorland monitors causing an exceedance. The concentration analysis further supports that the natural event affected air quality in such a way that there exists a clear causal relationship between the measured exceedance on October 31, 2014 and November 1, 2014 and the natural event, qualifying the natural event as an Exceptional Event.

IV Not Reasonably Controllable or Preventable

According to the October 3, 2016 promulgated revision to the Exceptional Event (EE) rule under 40 CFR §50.14(b)(8) air agencies must address the "not reasonably controllable or preventable" (nRCP) criterion as two prongs. To address the nRCP criterion the ICAPCD must not only identify the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance but must identify the relevant State Implementation Plan (SIP) measures and/or other enforceable control measures in place for the identified sources. An effective analysis of the nRCP must include the implementation status of the control measures to consider the measures as enforceable. USEPA considers control measures enforceable if approved into the SIP within 5 years of an EE demonstration submittal. The identified control measures must address those specific sources that as causing or contributing to a monitored exceedance.

The final EE rule revision explains that an event is not reasonably controllable if reasonable measures to control the impact of the event on air quality were applied at the time of the event. Similarly, an event is not reasonably preventable if reasonable measures to prevent the event were applied at the time of the event. However, for "high wind events" when PM_{10} concentrations are due to dust raised by high winds from desert areas whose sources are controlled with Best Available Control Measures (BACM) then the event is a "natural event" where human activity plays little or no direct causal role and thus is considered not preventable.

This section begins by providing background information on all SIP and other enforceable control measures in force during the EE for October 31, 2014 and November 1, 2014. In addition, this October 31, 2014 and November 1, 2014 demonstration provides technical and non-technical evidence that gusty westerly winds blew across the mountains and deserts within southeastern California and into Imperial County suspending particulate matter affecting the Brawley, Niland and Westmorland monitors on October 31, 2014 and November 1, 2014. This section identifies all natural and anthropogenic sources and provides regulatory evidence of the enforceability of the control measures in place during the October 31, 2014 and November 1, 2014 EE.

IV.1 Background

Inhalable particulate matter (PM_{10}) contributes to effects that are harmful to human health and the environment, including premature mortality, aggravation of respiratory and cardiovascular disease, decreased lung function, visibility impairment, and damage to vegetation and ecosystems. Upon enactment of the 1990 Clean Air Act (CAA) amendments, Imperial County was classified as moderate nonattainment for the PM_{10} NAAQS under CAA sections 107(d)(4)(B) and 188(a). By November 15, 1991, such areas were required to develop and submit State Implementation Plan (SIP) revisions providing for, among other things, implementation of reasonably available control measures (RACM).

Partly to address the RACM requirement, ICAPCD adopted local Regulation VIII rules to control PM_{10} from sources of fugitive dust on October 10, 1994, and revised them on November 25, 1996. USEPA did not act on these versions of the rules with respect to the federally enforceable SIP.

On August 11, 2004, USEPA reclassified Imperial County as a serious nonattainment area for PM_{10}. As a result, CAA section 189(b)(1)(B) required all BACM to be implemented in the area within four years of the effective date of the reclassification, i.e., by September 10, 2008.

On November 8, 2005, partly to address the BACM requirement, ICAPCD revised the Regulation VIII rules to strengthen fugitive dust requirements. On July 8, 2010, USEPA finalized a limited approval of the 2005 version of Regulation VIII, finding that the seven Regulation VIII rules largely fulfilled the relevant CAA requirements. Simultaneously, USEPA also finalized a limited disapproval of several of the rules, identifying specific deficiencies that needed to be addressed to fully demonstrate compliance with CAA requirements regarding BACM and enforceability.

In September 2010, ICAPCD and the California Department of Parks and Recreation (DPR) filed petitions with the Ninth Circuit Federal Court of Appeals for review of USEPA's limited disapproval of the rules. After hearing oral argument on February 15, 2012, the Ninth Circuit directed the parties to consider mediation before rendering a decision on the litigation. On July 27, 2012, ICAPCD, DPR and USEPA reached agreement on a resolution to the dispute which included a set of specific revisions to Regulation VIII. These revisions are reflected in the version of Regulation VIII adopted by ICAPCD on October 16, 2012 and approved by USEPA April 22, 2013. Since 2006 ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County

FIGURE 4-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT

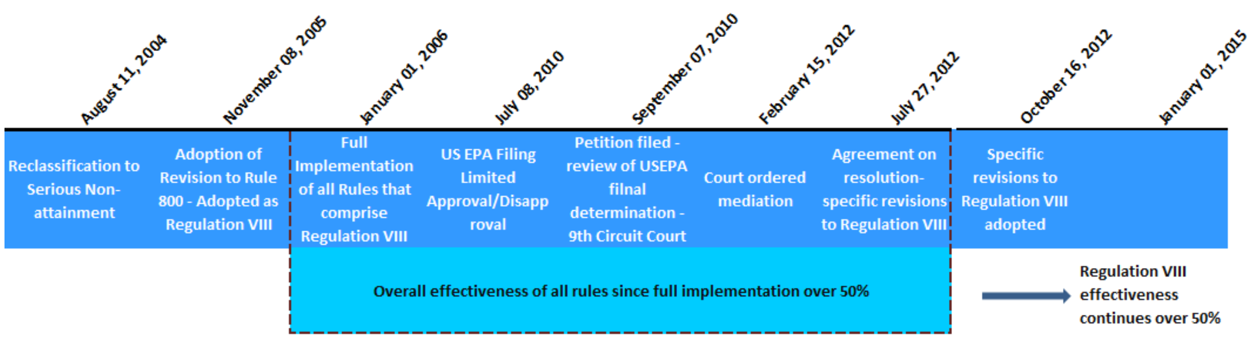


Fig 4-1: Regulation VIII Graphic Timeline

IV.1.a Control Measures

Below is a brief summary of Regulation VIII, which is comprised of seven fugitive dust rules. **Appendix D** contains a complete set of the Regulation VIII rules.

ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM_{10} from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the United States Bureau of Land Management (BLM), United States Border Patrol (BP) and DPR to submit dust control plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B of Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit in winds over 25 mph under certain conditions.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires land owners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempted.
Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempted.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generate dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

IV.1.b Additional Measures

Imperial County Natural Events Action Plan (NEAP)

On August 2005, the ICAPCD adopted a NEAP for the Imperial County, as was required under the former USEPA Natural Events Policy, to address PM_{10} events by:

- Protecting public health;
- Educating the public about high wind events;
- Mitigating health impacts on the community during future events; and
- Identifying and implementing BACM measures for anthropogenic sources of windblown dust.

Smoke Management Plan (SMP) Summary

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California, which are required to implement a district-wide smoke management program. The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning. The revisions to the 1987 Guidelines approved March 14, 2001. All air districts, with the exception of the San Joaquin Valley Air Pollution Control District (SJAPCD) were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines.

Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

On a daily basis, the ICAPCD reviews surface meteorological reports from various airport agencies, the NWS, State fire agencies and CARB to help determine whether the day is a burn day. Using a four-quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required to notice and advise members of the public of a potential burn. This noticing requirement is the Good Neighbor Policy. On October 31, 2014 and November 1, 2014, declared "No Burn" days, the ICAPCD did not receive any agricultural burning complaints. **Appendix A** contains copies of pertinent notices to the exceptional event.

IV.1.c Review of Source-Permitted Inspections and Public Complaints

A query of the ICAPCD permit database was compiled and reviewed for active permitted sources throughout Imperial County and specifically around Brawley, Niland and Westmorland during the October 31, 2014 and November 1, 2014 PM_{10} exceedance. Both permitted and non-permitted sources are required to comply with Regulation VIII requirements that address fugitive dust emissions. The identified permitted sources are Aggregate Products, Inc., US Gypsum Quarry, Imperial Aggregates (Val-Rock, Inc., and Granite Construction), US Gypsum Plaster City, Clean Harbors (Laidlaw Environmental Services), Bullfrog Farms (Dairy), Burrtec Waste Industries, Border Patrol Inspection station, Centinela State Prison, various communications towers not listed and various agricultural operations. Non-permitted sources include the wind farm known as Ocotillo Express, and a solar facility known as CSolar IV West. Finally, the desert regions are under the jurisdiction of the Bureau of Land Management and the California Department of Parks (Including Anza Borrego State Park and Ocotillo Wells).

An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM_{10} emissions. There were no complaints filed on October 31, 2014 or on November 1, 2014, officially declared as a "Green Waste Burn" day and a "No Burn" day, related to agricultural burning or dust. However, the ICAPCD did receive a residential or waste burn complaint. The complaint asserted after hours residential burning within in Imperial, California. The follow up investigation by certified personnel found the complaint unsubstantiated when evidence of an illegal residential burn at the identified location was lacking. **Appendix A** contains copies of notices pertinent to the October 31, 2014 and November 1, 2014 event.

FIGURE 4-2
PERMITTED SOURCES

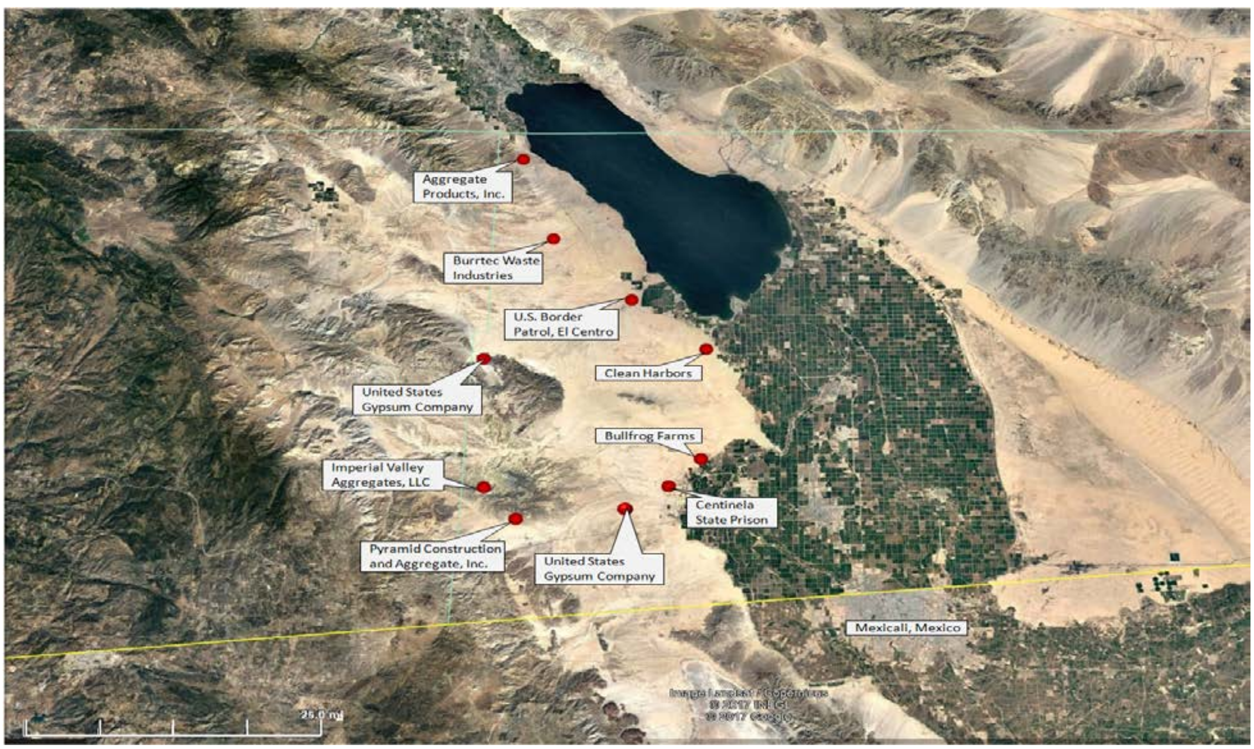


Fig 4-2: The above map identifies those permitted sources located west, northwest and southwest of the Brawley, Niland and Westmorland monitors. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States and Mexico. The green checker-boarded areas are a mixed use of agricultural and community parcels. In addition, either the Bureau of Land Management or the California Department of Parks manages the desert areas. Base map from Google Earth

FIGURE 4-3
NON-PERMITTED SOURCES

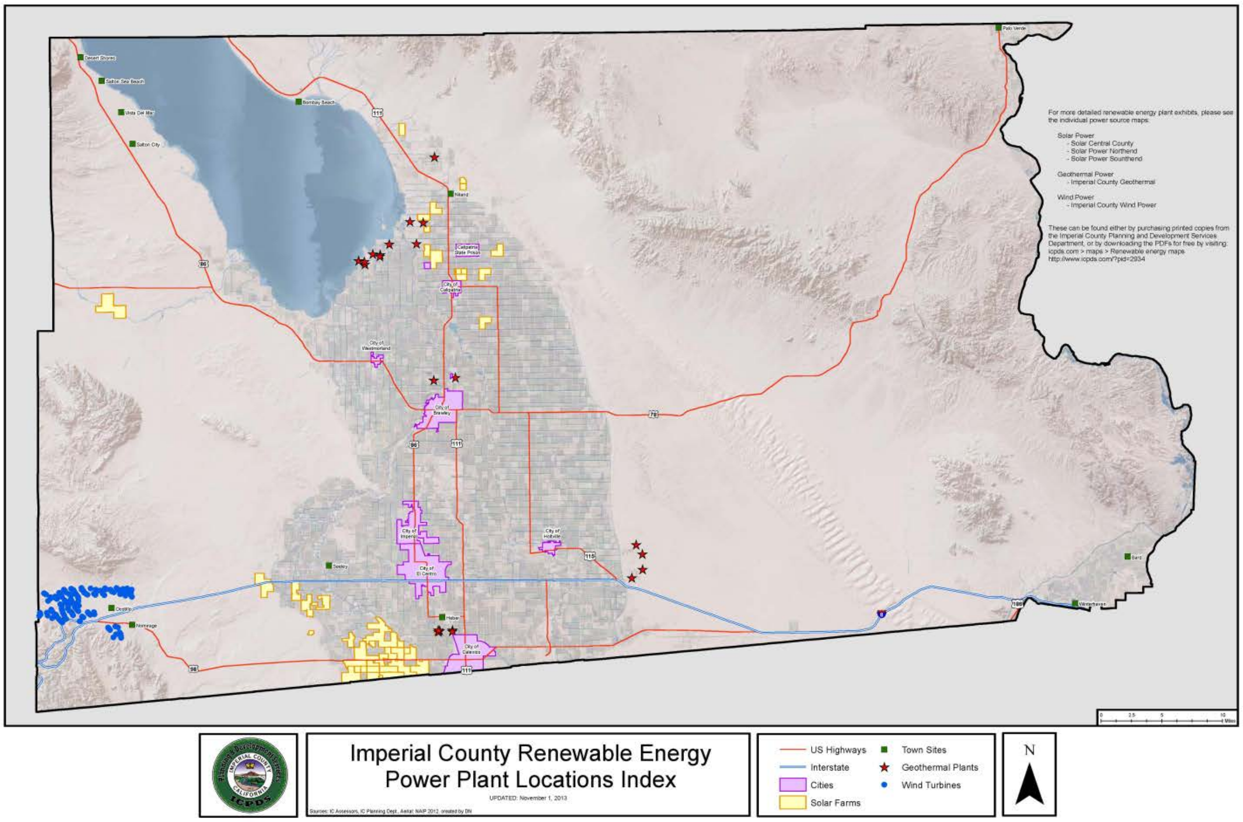


Fig 4-3: The above map identifies those power sources located west, northwest and southwest of the Brawley, Niland and Westmorland monitors. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

IV.2 Forecasts and Warnings

As discussed above as early as October 28, 2014 the San Diego NWS office discussed the approaching trough onto the west coast and forecasted the potential increase and shift of winds Friday, October 31, 2014 during the evening hours. Essentially, the San Diego NWS office described a pattern change for Friday October 31, 2014 through Saturday, November 1, 2014 from an easterly flow to a westerly flow when the existing upper-level high pressure weakened and the onshore flow returned. Consequently, the San Diego NWS office issued its first of nine Urgent Weather Messages at 1252 PST for major Mountain and desert areas including the San Diego Mountains and deserts. The Urgent Weather Message contained a wind advisory effective 1900 PST through 1600 PST Saturday, extended to 200 Sunday, November 2, 2014 during the issued advisory Saturday November 1, 2014. All the issued wind advisories included forecast west to southwest winds 25 to 35mph, gusts up to 55mph and higher in prone areas. Areas identified included mountain ridges, desert slopes, adjacent desert areas, Interstate 10 and Interstate 8. Finally, identified impacts included reduced visibility due to blowing sand and in higher elevations reduced visibility due to blowing snow. By contrast, the Phoenix office acknowledged the movement of the strong dry cold front into Arizona by November 1, 2014. Consequently, the Phoenix NWS office issued a single Special Weather Statement for early morning in Imperial and El Centro Saturday November 1, 2014 identifying strong gusty southwest winds.

IV.3 Wind Observations

Wind data during the event were available from airports in eastern Riverside County, southeastern San Diego County, southwest Yuma County (Arizona), northern Mexico, and Imperial County. Both Imperial County Airport (KIPL) and El Centro NAF (KNJK) measured brief periods of gusty winds on October 31, 2014. On November 1,2014 KIPL measured three hours of winds at or above the 25 mph threshold with a peak gust of 40 mph. KNJK measured nine hours of winds at or above the 25 mph threshold. Top gusts at the airport was 53 mph (measured on four separate occasions). Wind speeds of over 25 mph are normally sufficient to overcome most PM_{10} control measures. During the October 31, 2014 and November 1, 2014 event, wind speeds were above the 25 mph threshold overcoming the BACM in place.

IV.4 Summary

The weather and air quality forecasts and warnings outlined in this section demonstrate that gusty westerly winds generated by a low pressure system and a strong cold front that moved through southern California caused uncontrollable PM_{10} emissions. The BACM list as part of the control measures in Imperial County for fugitive dust emissions were in place at the time of the event. These control measures are required for areas designated as "serious" non-attainment for PM_{10}, such as Imperial County. Thus, the BACM in place at the time of the event were beyond reasonable. In addition, surface wind measurements in the Brawley, Niland, Westmorland and surrounding areas to the north and south of Brawley, Niland and Westmorland during the event were high enough (at or above 25 mph, with wind gusts up to 53 mph), that BACM PM_{10} control measures would have been overwhelmed.

Finally, a high wind dust event may be a natural event, even when portions of the wind-driven emissions are anthropogenic, as long as those emissions have a clear causal relationship to the event and are determined to be not reasonably controllable or preventable. This demonstration has shown that the event that occurred on October 31, 2014 and November 1, 2014 was not reasonably controllable or preventable despite the strong and in force BACM within the affected areas in Imperial County. This demonstration has similarly established a clear causal relationship between the exceedance and the high wind event timeline and geographic location. Thus, the October 31, 2014 and November 1, 2014 event is an exceptional event under the requirements of the exceptional event rule.

V Clear Causal Relationship

V.1 Discussion

Meteorological observations for October 31, 2014 and November 1, 2014 identified a major Pacific trough that approached Northern California Friday, October 31, 2014 then moved down the coast into San Diego pushing a cold front across the region late Friday, October 31, 2014 through Saturday, November 1, 2014. As the winter-like storm pushed through a trough of low pressure deepened down the west coast bringing stronger onshore flow. As a result, strong gusty westerly winds blew across southeastern California with the strongest winds and highest gusts, within the mountains passes and desert slopes of San Diego County late Friday October 31, 2014 into Saturday November 1, 2014.[13]

Entrained windblown dust from natural areas, particularly from the desert areas west of the Brawley, Niland and Westmorland monitors, along with anthropogenic sources controlled with BACM, is confirmed by the meteorological and air quality observations October 31, 2014 and November 1, 2014. The deepening of the low pressure increased surface gradients creating strong gusty westerly winds, which blew across southeastern California affecting air quality and causing exceedances in Brawley, Niland and Westmorland on October 31, 2014 and November 1, 2014.

Figures 5-1 through 5-3 provide information regarding the conditions that existed that caused the strong westerly winds to transport windblown dust into Imperial County on October 31, 2014 and November 1, 2014 affecting air quality and air monitors within the northern portion of the air monitoring network in Imperial County.

[13] Area Forecast Discussion National Weather Service 815 PM PST (915 PM PDT) Friday, October 31, 2014 and 1225 PM PST (125 PM PDT); 758 PM PST (858 PM PDT) Saturday, November 1, 2014

FIGURE 5-1
PACKED PRESSURE GRADIENTS

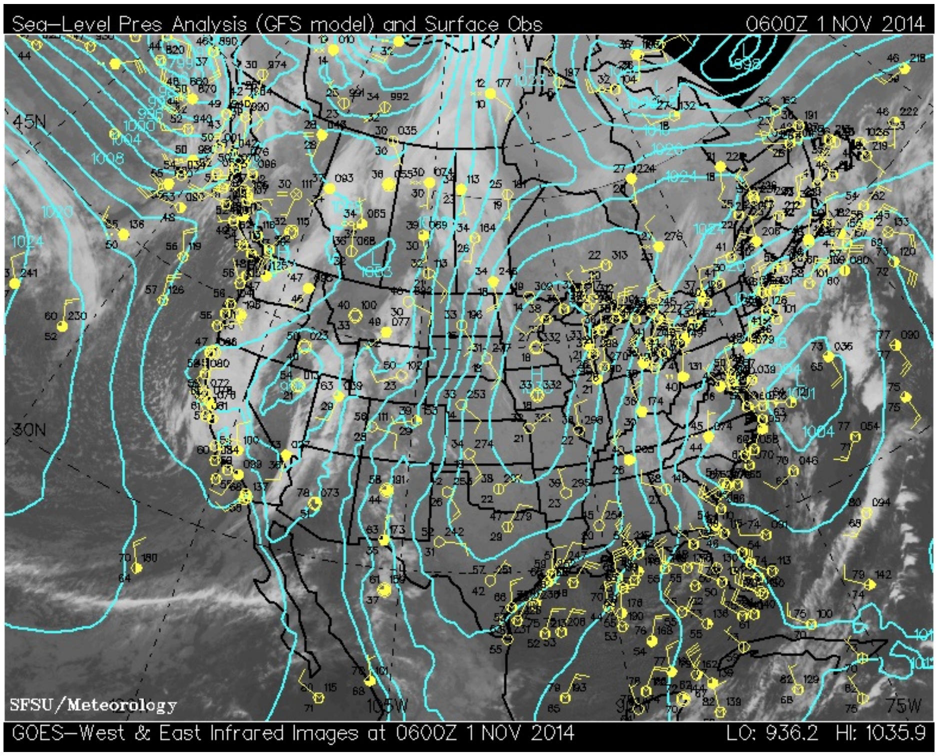


Fig 5-1: A GOES East-West satellite image shows the pressure gradient near its most packed at 2200 PST on October 31, 2014. This led to the development of high winds in the region. Source: SFSU Department of Earth and Climate Sciences and the California Regional weather Server; http://squall.sfsu.edu/crws/archive/sathts_arch.html

Figure 5-2 is a satellite image of an extensive layer of the Aerosols Optical Depth (AOD) using the Deep Blue layer over southeastern California, southwestern Arizona, and down into Mexico, October 31, 2014.[14] Warmer colors indicate a thicker AOD column. Unfortunately, both the Terra and Aqua satellites carrying the MODIS instrument[15] made their pass before winds ramped up and PM_{10} concentrations were at their highest. Still, the images show that there was a substantial amount of particulate matter over the area.

[14] **Aerosol Optical Depth (AOD)** (or Aerosol Optical Thickness) indicates the level at which particles in the air (aerosols) prevent light from traveling through the atmosphere. Aerosols scatter and absorb incoming sunlight, which reduces visibility. From an observer on the ground, an AOD of less than 0.1 is “clean” - characteristic of clear blue sky, bright sun and maximum visibility. As AOD increases to 0.5, 1.0, and greater than 3.0, aerosols become so dense that sun is obscured. Sources of aerosols include pollution from factories, smoke from fires, dust from dust storms, sea salt, and volcanic ash and smog. Aerosols compromise human health when inhaled by people, particularly those with asthma or other respiratory illnesses. Source: https://worldview.earthdata.nasa.gov. The **Deep Blue Aerosol Optical Depth** layer is useful for studying aerosol optical depth over land surfaces. This layer is created from the Deep Blue (DB) algorithm, originally developed for retrieving over desert/arid land (bright in the visible wavelengths) where Dark Target approaches fail.

[15] MODIS (or Moderate Resolution Imaging Spectroradiometer) is a key instrument aboard the Terra (originally known as EOS AM-1) and Aqua (originally known as EOS PM-1) satellites. Terra's orbit around the Earth is timed so that it passes from north to south across the equator in the morning, while Aqua passes south to north over the equator in the afternoon. MODIS Technical Specifications identify the Terra orbit at 10:30am and the Aqua at 1:30pm.

FIGURE 5-2
EXTENSIVE LAYER OF AEROSOLS OVER SOUTHEASTERN CALIFORNIA

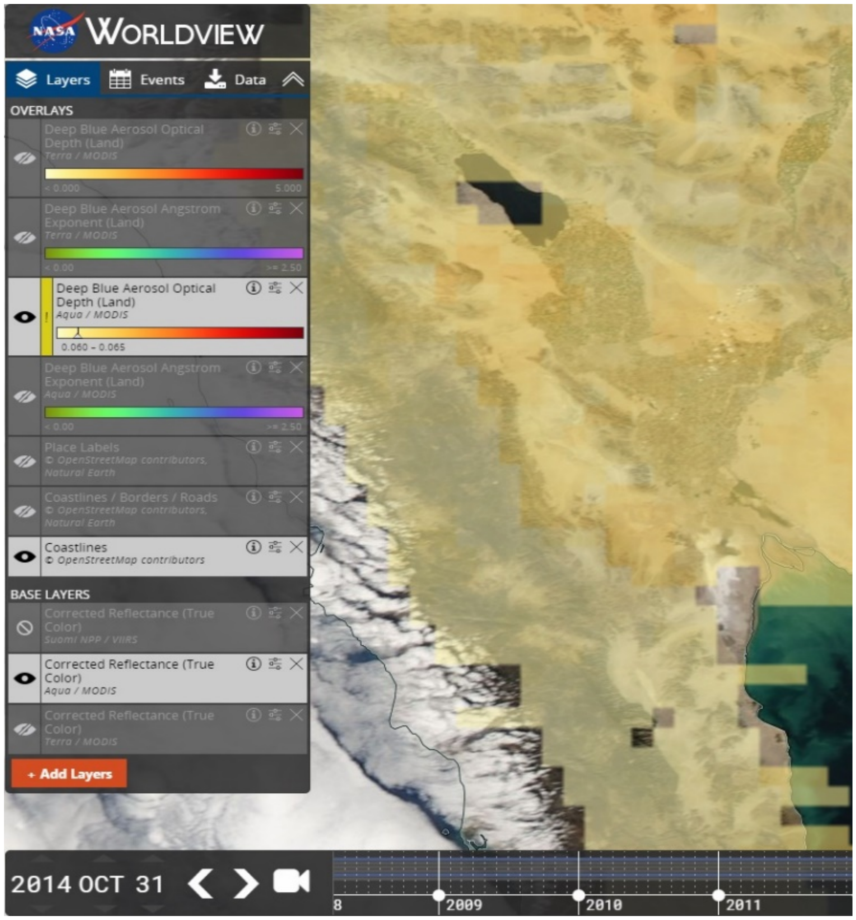


Fig 5-2: The AOD at around ~1330 PST as captured by the Aqua satellite on October 31, 2014. Source: NASA Worldview; https://worldview.earthdata.nasa.gov

The Deep Blue Angstrom Angström Exponent layer[16] (**Figure 5-3**) used to discriminate aerosol particle size, which can identify aerosols that are likely dust. Although there was cloud cover on November 1, 2014, which can hinder AOD detection, the MODIS instrument onboard the Aqua satellite detected dust-sized aerosols (dark green colored patches) transported across Imperial County at around 1330 PST.

[16] The MODIS Deep Blue Aerosol Ångström Exponent layer can be used to provide additional information related to the aerosol particle size over land. This layer is created from the Deep Blue (DB) algorithm, originally developed for retrieving over desert/arid land (bright in the visible wavelengths). The Ångström exponent provides additional information on the particle size (larger the exponent, the smaller the particle size). Values < 1 suggest optical dominance of coarse particles (e.g. dust) and values > 1 suggest optical dominance of fine particles (e.g. smoke) (see legend on left of image).

FIGURE 5-3
DUST SIZED AEROSOLS OVER SOUTHERN IMPERIAL COUNTY

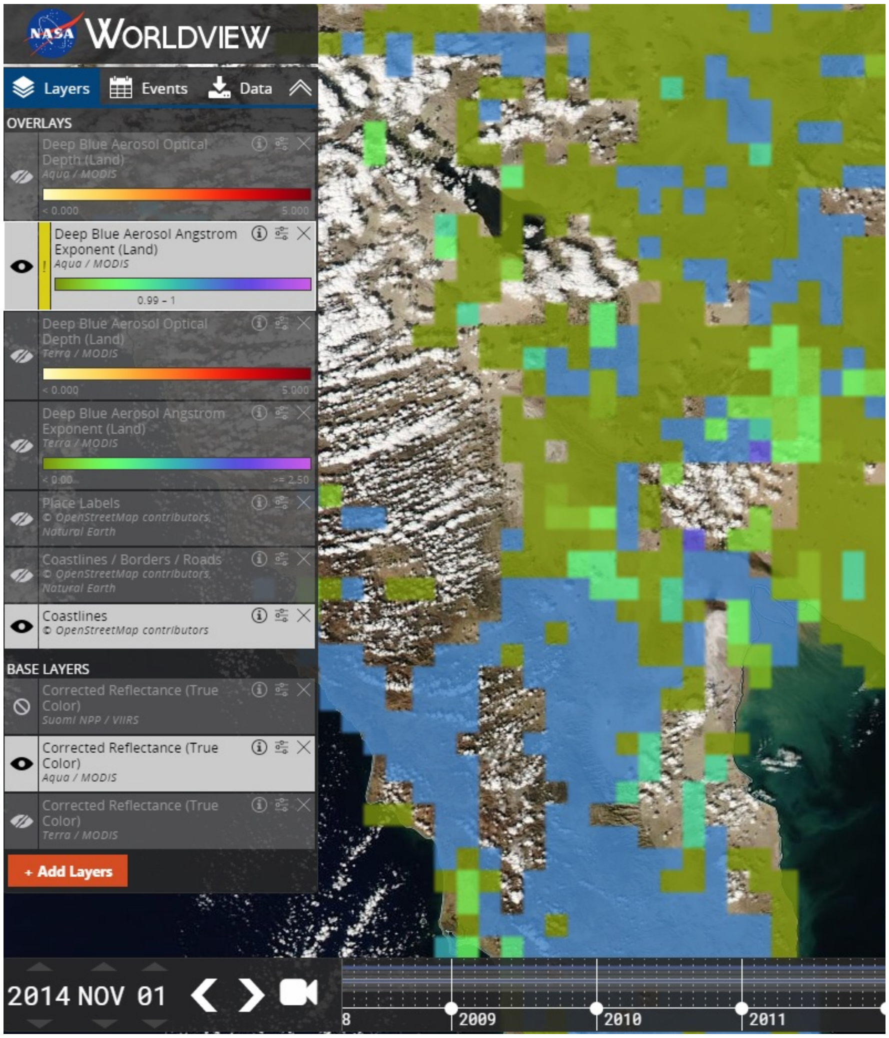


Fig 5-3: Dust-sized aerosols transported across Imperial County as captured by the Aqua satellite on November 1, 2014 at around ~1330 PST. Source: NASA Worldview; https://worldview.earthdata.nasa.gov

The EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states.[17] **Tables 5-1 through 5-5** provide a temporal relationship of wind speeds, wind direction, wind gusts (if available), and PM_{10} concentrations at the exceeding stations. The Brawley station does not have its own meteorological instruments, as does Niland. The Westmorland station did not measure wind in 2014. The Mountain Springs Grade measured strong west winds blowing across and through the mountain passes of San Diego County, down the canyon/desert slopes along Interstate 8 and into the desert floor of Imperial County. The strong southwest winds transported windblown dust toward Brawley, Niland, and Westmorland, elevating concentrations sufficiently to cause an exceedance.

[17] "Treatment of Data Influenced by Exceptional Events; Final Guidance", FR Vol. 81, No. 191, 68279, October 3, 2016

TABLE 5-1
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR NILAND OCTOBER 31, 2014

Mountain Springs Grade (TNSC1)				Fish Creek Mountains (FHCC1)				Imperial County Airport (KIPL)				El Centro NAF (KNJK)				Niland			Niland
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/D	PM_{10} (µg/m³)
050	16	24	207	026	6	10	191	053	5		240	056	5		270	000	5	70	51
150	14	28	198	126	8	12	193	153	6		260	156	6		300	100	4	103	40
250	19	26	198	226	10	16	200	253	0		0	256	5		230	200	6	113	31
350	19	25	199	326	5	13	194	353	0		0	356	0		0	300	4	185	41
450	20	25	203	426	5	9	236	453	3		230	456	0		0	400	5	110	66
550	23	33	203	526	5	8	185	553	3		220	556	5		170	500	3	109	45
650	29	39	200	626	10	14	197	653	3		200	656	5		150	600	5	137	58
750	28	36	201	726	11	17	205	753	0		0	756	6		210	700	3	116	60
850	25	35	207	826	7	14	208	853	3		300	856	6		290	800	4	125	52
950	22	33	210	926	4	11	253	953	6		310	956	6		350	900	6	123	52
1050	19	29	211	1026	3	8	210	1053	5		VR	1056	7		340	1000	7	127	69
1150	17	27	203	1126	4	8	272	1153	5		VR	1156	3		VR	1100	6	166	70
1250	16	23	224	1226	3	10	316	1253	5		260	1256	5		VR	1200	5	171	59
1350	12	25	237	1326	4	11	180	1353	6		VR	1356	0		0	1300	6	181	79
1450	21	33	225	1426	7	15	149	1453	5		220	1456	5		180	1400	9	169	117
1550	18	31	228	1526	13	21	196	1553	5		270	1556	17		260	1500	7	194	90
1650	27	41	221	1626	11	24	189	1653	18		260	1656	23	32	250	1600	3	272	65
1750	25	41	225	1726	16	27	198	1753	10		250	1756	16		260	1700	8	224	456
1850	26	41	216	1826	19	27	201	1853	13		270	1856	20		250	1800	12	213	603
1950	28	46	216	1926	19	28	201	1953	7		260	1956	13		250	1900	5	193	714
2050	29	42	215	2026	15	29	194	2053	15		260	2056	18		260	2000	3	209	460
2150	20	46	216	2126	19	29	206	2153	10		270	2156	21		260	2100	5	253	240
2250	28	41	224	2226	16	36	223	2253	9		280	2256	24	32	250	2200	9	240	245
2350	26	49	226	2326	14	24	198	2353	25	33	250	2356	31		240	2300	17	257	585

Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for the Fish Creek Mountains (FHCC1) and Mountain Springs Grade (TNSC1) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees. Because different instruments measure at different times throughout the day, the measured concentrations are compared to the closest hour of measured winds and gusts at local meteorological stations, not necessarily an averaged hour. Niland station does not measure wind gusts

TABLE 5-2
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR NILAND OCTOBER 31, 2014

Sunrise-Ocotillo (IMPSD)				Ocotillo Wells (AS389/KD6RSQ5)				Borrego Springs (BRGSD)				Salton City			Niland			Niland
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/D	HOUR	W/S	W/D	PM_{10} (µg/m³)
050	8	11	212	058	4	8	328	000	7	8	191	000	4	250	000	5	70	51
150	6	9	222	154	8	12	14	100	5	8	303	100	6	263	100	4	103	40
250	7	13	218	254	6	11	1	200	3	4	315	200	5	262	200	6	113	31
350	9	12	220	357	6	8	318	300	2	3	295	300	6	238	300	4	185	41
450	6	9	229	457	5	6	314	400	3	4	304	400	7	229	400	5	110	66
550	15	19	209	559	6	10	338	500	4	6	301	500	7	230	500	3	109	45
650	15	19	208	655	3	5	328	600	2	3	324	600	6	238	600	5	137	58
750	14	19	216	758	0	2		700	4	6	305	700	2	242	700	3	116	60
850	14	19	216	854	5	7	141	800	0	0		800	4	69	800	4	125	52
950	13	19	209	957	6	9	207	900	1	3	149	900	5	91	900	6	123	52
1050	12	16	209	1053	5	9	146	1000	2	4	58	1000	2	38	1000	7	127	69
1150	13	18	213	1157	6	10	165	1100	2	9	115	1100	4	74	1100	6	166	70
1250	9	15	228	1257				1200	5	11	125	1200	5	77	1200	5	171	59
1350	15	22	218	1357				1300	6	12	101	1300	6	96	1300	6	181	79
1450	14	20	214	1457				1400	6	10	107	1400	7	117	1400	9	169	117
1550	12	25	238	1554	11	21	308	1500	11	15	103	1500	9	122	1500	7	194	90
1650	15	26	234	1657	13	29	315	1600	9	12	199	1600	5	111	1600	3	272	65
1750	19	30	213	1753	15	36	283	1700	10	15	186	1700	18	248	1700	8	224	456
1850	12	20	246	1857	12	26	302	1800	8	11	95	1800	19	250	1800	12	213	603
1950	13	27	233	1952	20	34	318	1900	3	5	129	1900	17	255	1900	5	193	714
2050	9	18	264	2057	15	23	308	2000	5	10	190	2000	20	252	2000	3	209	460
2150	30	45	222	2158	15	32	312	2100	4	6	66	2100	21	254	2100	5	253	240
2250	13	26	230	2254	17	28	329	2200	23	37	203	2200	20	260	2200	9	240	245
2350	8	14	276	2357	20	34	343	2300	16	32	206	2300	25	256	2300	17	257	585

Wind data for Sunrise-Ocotillo (IMPSD), Ocotillo Wells (AS398/KD6RSQ5), and Borrego Springs (BRGSD) from the University of Utah's MesoWest system. Salton City wind data from AQMIS2. Wind speeds = mph; Direction = degrees. Because different instruments measure at different times throughout the day, the measured concentrations are compared to the closest hour of measured winds and gusts at local meteorological stations, not necessarily an averaged hour. Niland station does not measure wind gusts

TABLE 5-3
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR NILAND NOVEMBER 1, 2014

Sunrise-Ocotillo (IMPSD)				Ocotillo Wells (AS389/KD6RSQ5)				Borrego Springs (BRGSD)				Salton City			Niland			Niland
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/D	HOUR	W/S	W/D	PM_{10} (µg/m³)
050	8	18	292	052	15	24	345	000	16	26	191	000			000	12	253	440
150	8	18	255	157	10	22	14	100	11	33	182	100			100	16	260	915
250	8	18	256	259	16	26	322	200	7	13	184	200			200	9	236	486
350	9	17	292	355	16	24	339	300	18	27	248	300	16	276	300	6	194	255
450	6	19	255	458	4	8	325	400	3	6	210	400	15	276	400	8	223	192
550	6	15	250	557	17	31	319	500	14	27	233	500	8	214	500	3	179	173
650	7	16	239	657	18	28	322	600	10	16	323	600	14	239	600	4	176	149
750	12	19	280	757	11	21	347	700	10	17	320	700	18	255	700	7	264	148
850	14	25	273	856	8	14	300	800	9	17	316	800	17	270	800	21	276	852
950	10	15	239	959	9	19	307	900	5	10	297	900	24	254	900	19	278	95
1050	10	21	260	1059	11	23	325	1000	10	18	288	1000	23	249	1000	19	276	82
1150	9	17	263	1158	14	26	302	1100	7	13	263	1100	17	256	1100	19	273	334
1250	9	15	252	1257	11	23	305	1200	6	13	149	1200	22	251	1200	16	279	38
1350	11	19	262	1357	12	26	304	1300	9	16	268	1300	23	251	1300	17	277	59
1450	12	20	262	1453	8	23	308	1400	11	16	255	1400	23	254	1400	19	273	70
1550	11	23	244	1557	11	26	304	1500	17	25	224	1500	21	249	1500	20	269	176
1650	10	19	256	1659	8	19	314	1600	7	15	273	1600	22	248	1600	19	264	80
1750	11	16	260	1757	10	24	311	1700	8	15	250	1700	24	249	1700	19	262	78
1850	11	20	260	1858	7	15	309	1800	8	12	228	1800	21	253	1800	20	261	78
1950	10	17	253	1954	7	11	305	1900	10	15	222	1900	19	243	1900	20	266	80
2050	7	10	240	2057	6	10	352	2000	8	13	274	2000	20	246	2000	22	264	177
2150	8	14	254	2157	10	15	322	2100	8	12	300	2100	24	256	2100	22	263	82
2250	11	17	259	2256	8	12	315	2200	3	4	318	2200	17	253	2200	22	266	104
2350	9	15	247	2359	10	18	311	2300	5	6	327	2300	17	262	2300	18	270	107

Wind data for Sunrise-Ocotillo (IMPSD), Ocotillo Wells (AS398/KD6RSQ5), and Borrego Springs (BRGSD) from the University of Utah's MesoWest system. Salton City wind data from AQMIS2. Wind speeds = mph; Direction = degrees. Because different instruments measure at different times throughout the day, the measured concentrations are compared to the closest hour of measured winds and gusts at local meteorological stations, not necessarily an averaged hour. Niland station does not measure wind gusts

TABLE 5-4
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR NILAND NOVEMBER 1, 2014

Mountain Springs Grade (TNSC1)				Fish Creek Mountains (FHCC1)				Imperial County Airport (KIPL)				El Centro NAF (KNJK)				Niland			Niland
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/D	PM_{10} (µg/m³)
050	30	48	229	026	14	26	207	053	25	33	240	056	26	34	250	000	12	253	440
150	26	48	226	126	11	20	191	153	21	25	250	156	28	39	240	100	16	260	915
250	28	47	220	226	8	19	179	253	16	23	230	256	25	43	190	200	9	236	486
350	30	46	207	326	9	14	164	353	7	31	270	356	45	53	240	300	6	194	255
450	27	45	211	426	6	14	196	453	11	21	240	456	17		240	400	8	223	192
550	25	43	208	526	5	7	202	553	16	23	250	556	17	25	250	500	3	179	173
650	20	41	244	626	2	15	359	653	21	29	230	656	30	36	230	600	4	176	149
750	25	40	246	726	8	12	102	753	23	29	250	756	22	29	240	700	7	264	148
850	24	41	241	826	7	14	327	853	20	25	240	856	11	33	250	800	21	276	852
950	22	39	245	926	6	16	304	953	32	39	250	956	28	36	240	900	19	278	95
1050	19	33	254	1026	11	27	292	1053	21		260	1056	23	31	210	1000	19	276	82
1150	19	31	254	1126	9	21	274	1153	20		220	1156	22	28	240	1100	19	273	334
1250	19	32	242	1226	9	27	44	1253	18	33	250	1256	20		250	1200	16	279	38
1350	17	30	257	1326	11	26	289	1353	23		260	1356	17	26	250	1300	17	277	59
1450	17	31	254	1426	9	27	285	1453	18		240	1456	21	25	250	1400	19	273	70
1550	19	30	248	1526	7	27	278	1553	17	32	260	1556	22		240	1500	20	269	176
1650	15	29	246	1626	14	24	302	1653	16		260	1656	18		240	1600	19	264	80
1750	12	24	271	1726	11	20	298	1753	17		250	1756	15		240	1700	19	262	78
1850	8	20	282	1826	11	18	285	1853	21	30	260	1856	16		250	1800	20	261	78
1950	12	22	260	1926	8	23	310	1953	20		250	1956	22		250	1900	20	266	80
2050	10	20	266	2026	2	18	1	2053	21	28	250	2056	17		250	2000	22	264	177
2150	13	18	242	2126	7	23	291	2153	9		320	2156	29		250	2100	22	263	82
2250	8	22	265	2226	6	16	268	2253	14		270	2256	25		260	2200	22	266	104
2350	8	16	271	2326	2	13	309	2353	14		260	2356	25	33	260	2300	18	270	107

Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for the Fish Creek Mountains (FHCC1) and Mountain Springs Grade (TNSC1) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees. Because different instruments measure at different times throughout the day, the measured concentrations are compared to the closest hour of measured winds and gusts at local meteorological stations, not necessarily an averaged hour. Niland station does not measure wind gusts

TABLE 5-5
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR BRAWLEY NOVEMBER 1, 2014

Mountain Springs Grade (TNSC1)				Sunrise-Ocotillo (IMPSD)				Imperial County Airport (KIPL)				El Centro NAF (KNJK)				Fish Creek Mountains (FHCC1)				Brawley
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	PM_{10} (µg/m³)
050	30	48	229	050	8	18	292	053	25	33	240	056	26	34	250	026	14	26	207	
150	26	48	226	150	8	18	255	153	21	25	250	156	28	39	240	126	11	20	191	
250	28	47	220	250	8	18	256	253	16	23	230	256	25	43	190	226	8	19	179	
350	30	46	207	350	9	17	292	353	7	31	270	356	45	53	240	326	9	14	164	
450	27	45	211	450	6	19	255	453	11	21	240	456	17		240	426	6	14	196	437
550	25	43	208	550	6	15	250	553	16	23	250	556	17	25	250	526	5	7	202	116
650	20	41	244	650	7	16	239	653	21	29	230	656	30	36	230	626	2	15	359	239
750	25	40	246	750	12	19	280	753	23	29	250	756	22	29	240	726	8	12	102	200
850	24	41	241	850	14	25	273	853	20	25	240	856	11	33	250	826	7	14	327	278
950	22	39	245	950	10	15	239	953	32	39	250	956	28	36	240	926	6	16	304	177
1050	19	33	254	1050	10	21	260	1053	21		260	1056	23	31	210	1026	11	27	292	134
1150	19	31	254	1150	9	17	263	1153	20		220	1156	22	28	240	1126	9	21	274	101
1250	19	32	242	1250	9	15	252	1253	18	33	250	1256	20		250	1226	9	27	44	111
1350	17	30	257	1350	11	19	262	1353	23		260	1356	17	26	250	1326	11	26	289	79
1450	17	31	254	1450	12	20	262	1453	18		240	1456	21	25	250	1426	9	27	285	67
1550	19	30	248	1550	11	23	244	1553	17	32	260	1556	22		240	1526	7	27	278	60
1650	15	29	246	1650	10	19	256	1653	16		260	1656	18		240	1626	14	24	302	46
1750	12	24	271	1750	11	16	260	1753	17		250	1756	15		240	1726	11	20	298	45
1850	8	20	282	1850	11	20	260	1853	21	30	260	1856	16		250	1826	11	18	285	35
1950	12	22	260	1950	10	17	253	1953	20		250	1956	22		250	1926	8	23	310	30
2050	10	20	266	2050	7	10	240	2053	21	28	250	2056	17		250	2026	2	18	1	23
2150	13	18	242	2150	8	14	254	2153	9		320	2156	29		250	2126	7	23	291	134
2250	8	22	265	2250	11	17	259	2253	14		270	2256	25		260	2226	6	16	268	230
2350	8	16	271	2350	9	15	247	2353	14		260	2356	25	33	260	2326	2	13	309	90

Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for the Fish Creek Mountains (FHCC1), Sunrise-Ocotillo (IMPSD), and Mountain Springs Grade (TNSC1) from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees. Because different instruments measure at different times throughout the day, the measured concentrations are compared to the closest hour of measured winds and gusts at local meteorological stations, not necessarily an averaged hour. Brawley station does not record wind data

Figure 5-4 is a graphic depiction that combines the HYSPLIT trajectory, upstream wind speeds and important peak concentration times. As discussed above the passing of a winter-like storm provided the ideal conditions for the creation of strong gusty westerly winds the evening of October 31, 2014 allowing windblown dust to affect the Niland and Brawley air monitors. Upstream wind stations such as the Mountain Springs Grade station measured elevated winds 29 mph and gusts 46 mph from a southwest direction through the passes. As the terrain funneled the winds between the hours of 1600 PST to 2300 PST on October 31, 2014, a predominant westerly direction during the evening hours allowed windblown dust to affect the Niland monitor (714 µg/m^3) more so than the Brawley monitor.

FIGURE 5-4
EXCEEDANCE FACTORS OCTOBER 31, 2014

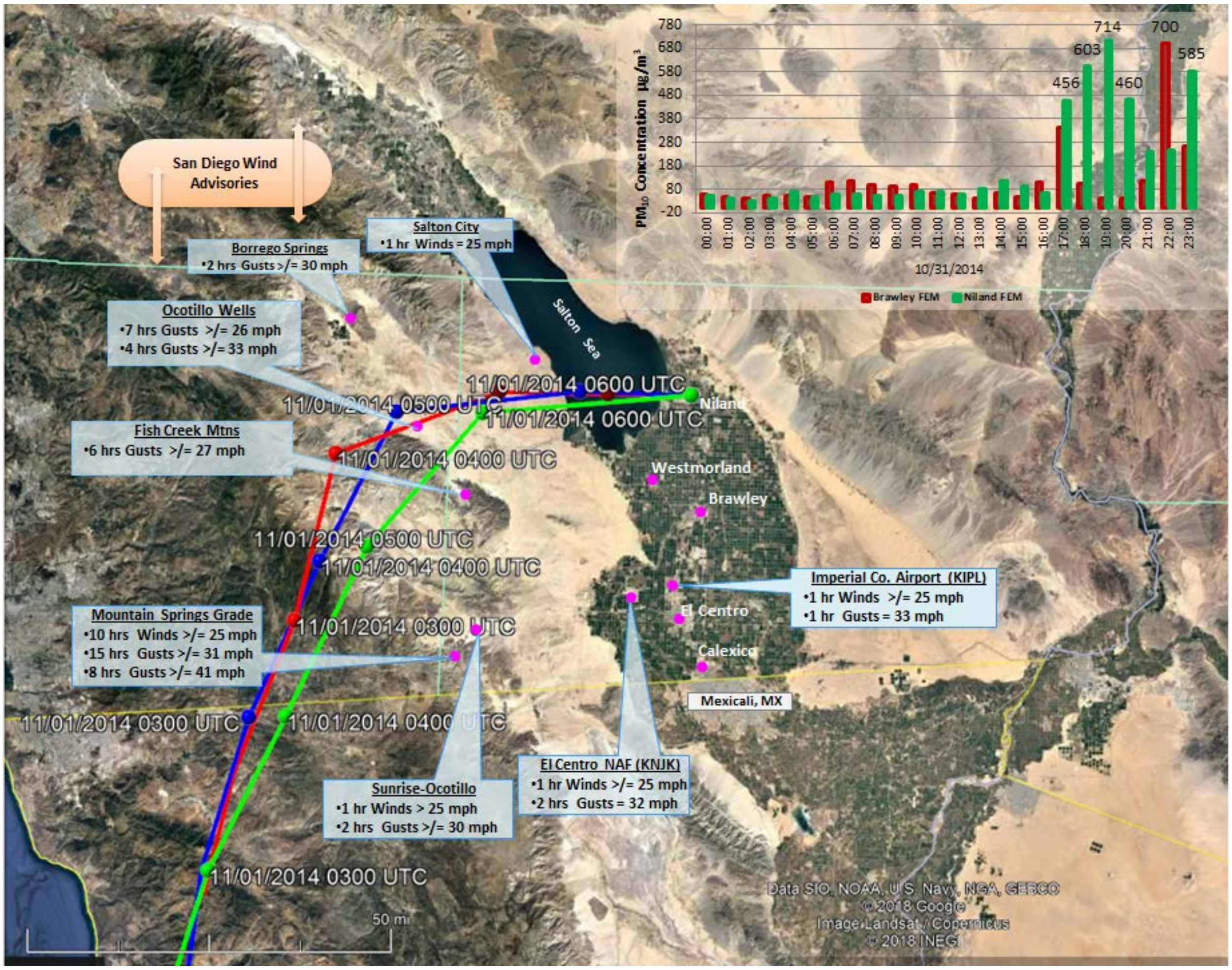


Fig 5-4: A six-hour HYSPLIT back-trajectory ending at Niland at 2300 PST on October 31, 2014 illustrates the path of the wind as it blew across the San Diego Mountain passes and desert slopes into Imperial County over agricultural lands affecting the Niland monitor. Red lines indicate airflow at 10 meters AGL (above ground level); blue=100m; green=500m. HYSPLIT model generated through NOAA's Air Resources Laboratory. Aqua lines are county lines. Yellow line is the international border. Google base map

As winds and gusts continued to elevate through November 1, 2014 so did measured concentrations at the Brawley, Niland and Westmorland monitors. **Figure 5-5** provides a graphic depiction of conditions that existed that allowed for the continued transport of windblown dust from areas located within the San Diego Mountain passes and deserts. Both Imperial County Airport (KIPL) and El Centro NAF (KNJK) measured at least two hours of winds at or above 25 mph.

November 1, 2014 was a scheduled run and as such both continuous and filter based samplers measured exceedances of the NAAQS, including the Brawley FRM monitor.

FIGURE 5-5
EXCEEDANCE FACTORS NOVEMBER 1, 2014

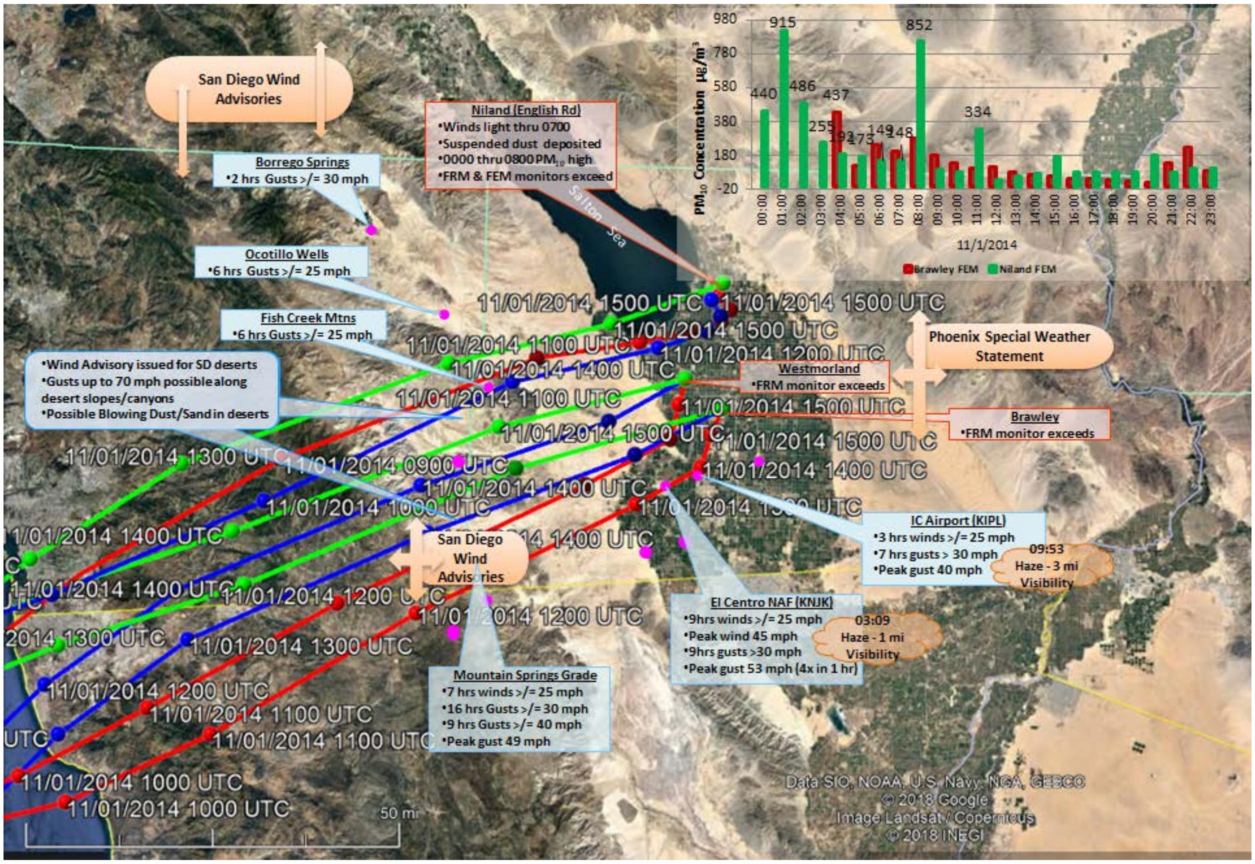


Fig 5-5: A 12-hour HYSPLIT back-trajectory ending at the Niland, Brawley, and Westmorland monitors at 0800 on November 1, 2014 illustrates the path of the air parcel as it passed through the San Diego Mountains and deserts over and into Imperial County deserts and agricultural lands. Red lines indicate airflow at 10 meters AGL (above ground level); blue=100m; green=500m. HYSPLIT model generated through NOAA's Air Resources Laboratory. Aqua lines are county lines. Yellow line is the international border. Google base map

Figures 5-6 and 5-7 depict PM_{10} concentrations and wind speeds over a 96-hour period at Brawley and Niland. Fluctuations in hourly concentrations at the Brawley and Niland monitors over a 96-hour period illustrate a positive correlation between elevated wind speeds, gusts and concentrations. The lower wind speeds at Niland created conditions that allowed for the concentrated deposition of windblown dust onto the monitor during the early morning hours of November 1, 2014. As measured winds at the Niland station increased during the afternoon hours of November 1, 2014, coincident with the passing of the weather system towards the east, concentrations sporadically dropped but continued to measure elevated concentrations sufficient to cause an exceedance. In 2014, the Westmorland station did not have an FEM monitor installed.

FIGURE 5-6
BRAWLEY PM_{10} CONCENTRATIONS AND WIND SPEED CORRELATION

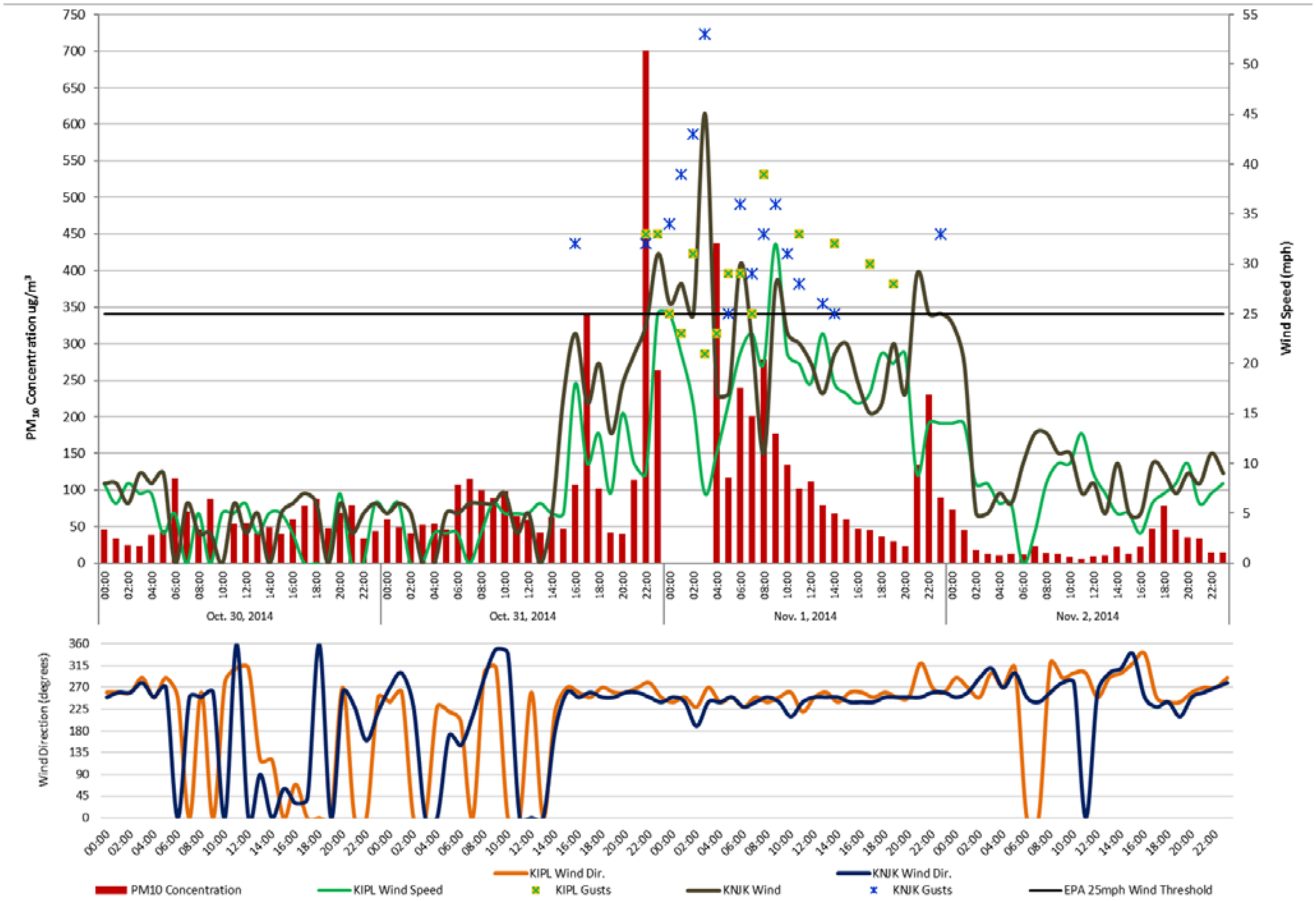


Fig 5-6: Brawley PM_{10} concentrations and wind speeds show a positive correlation with increased wind speeds on October 31, 2014 and November 1, 2014. The Brawley station does not measure wind data. Air quality data is from the EPA's AQS data bank. Wind data is from the NCEI's QCLCD system

FIGURE 5-7
NILAND PM_{10} CONCENTRATIONS AND WIND SPEED CORRELATION

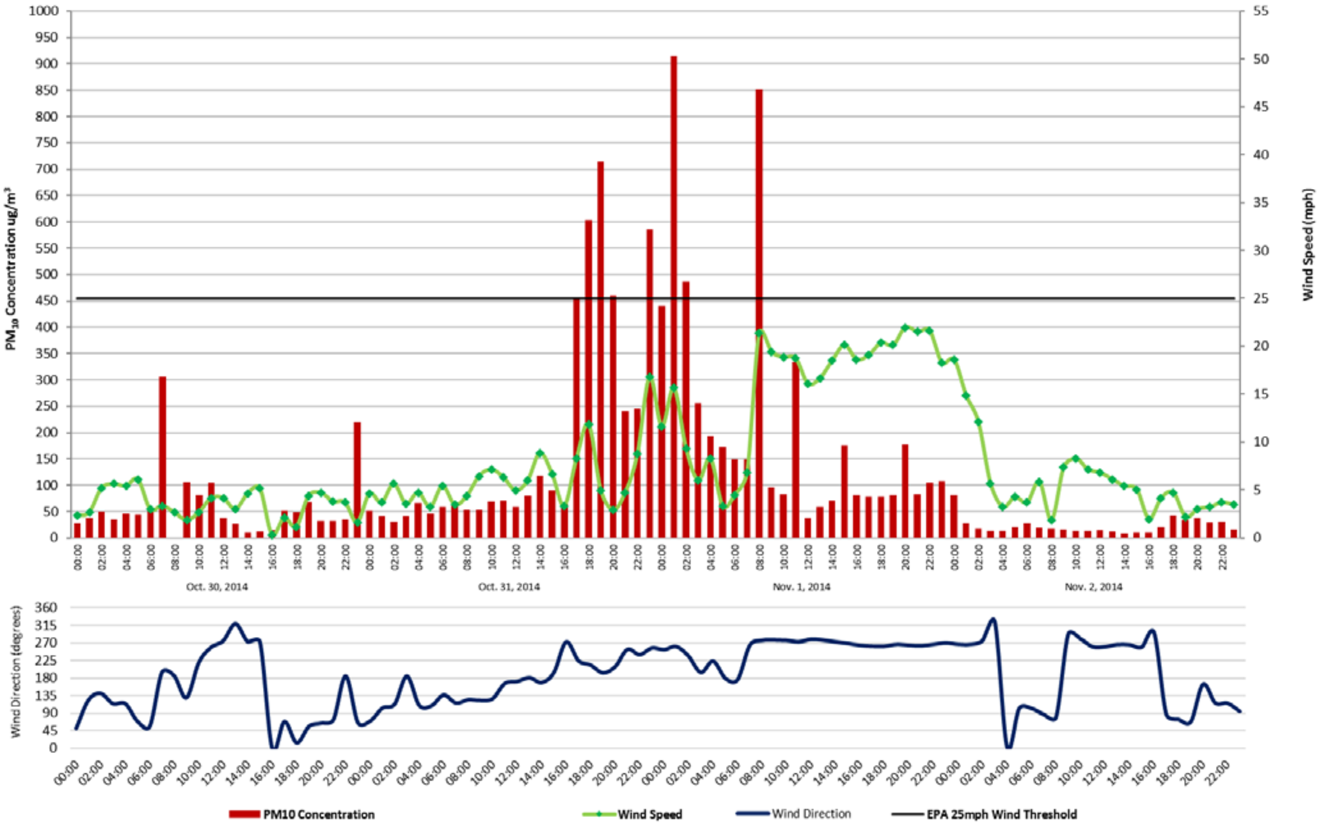


Fig 5-7: While measured winds did not reach the 25mph threshold at the Niland station, the lower wind speeds created conditions that allowed for the concentrated deposition of windblown dust onto the monitor during the early morning hours of November 11, 2014. As the system passed towards the east winds elevated causing less deposition onto the monitor but sufficient to cause an exceedance. Niland station does not measure wind gusts. Air quality and wind data is from the EPA's AQS data bank

FIGURE 5-8
PM_{10} CONCENTRATIONS AND WIND SPEED CORRELATION
BRAWLEY AND NILAND

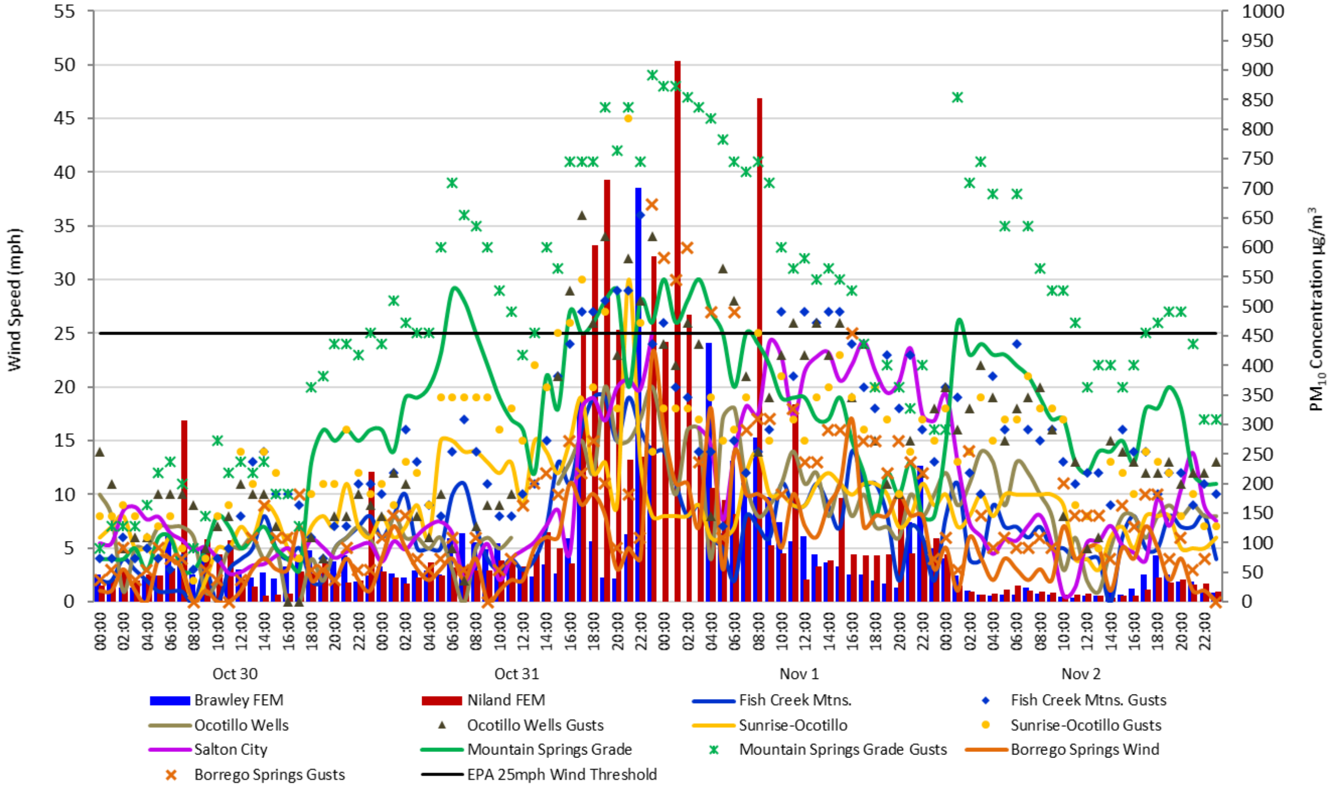


Fig 5-8: Niland and Brawley PM_{10} concentrations show a positive correlation with increased wind speeds at upstream locations. Air quality and wind data is from the EPA's AQS data bank. Wind data is from the University of Utah's MesoWest and AQQMIS2

Figure 5-9 compares the 96-hour concentrations at the Brawley and Niland monitors over a 96-hour period between October 30, 2014 and November 2, 2014 with visibility at local airports. [18] Reduced visibility occurred at Imperial County Airport (KIPL) and El Centro NAF (KNJK) coincident with measured peak concentrations at the Brawley and Niland monitors.

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[18] According to the NWS there is a difference between human visibility and the visibility measured by an Automated Surface Observing System (ASOS) or an Automated Weather Observing System (AWOS). The automated sensors measure clarity of the air vs. how far one can "see". The more moisture, dust, snow, rain, or particles in the light beam the more light scattered. The sensor measures the return every 30 seconds. The visibility value transmitted is the average 1-minute value from the past 10 minutes. The sensor samples only a small segment of the atmosphere, 0.75 feet therefore an algorithm is used to provide a representative visibility. Siting of the visibility sensor is critical and large areas should provide multiple sensors to provide a representative observation; http://www.nws.noaa.gov/asos/vsby.htm

FIGURE 5-9
PM_{10} CONCENTRATIONS AND VISIBILITY AT LOCAL AIRPORTS

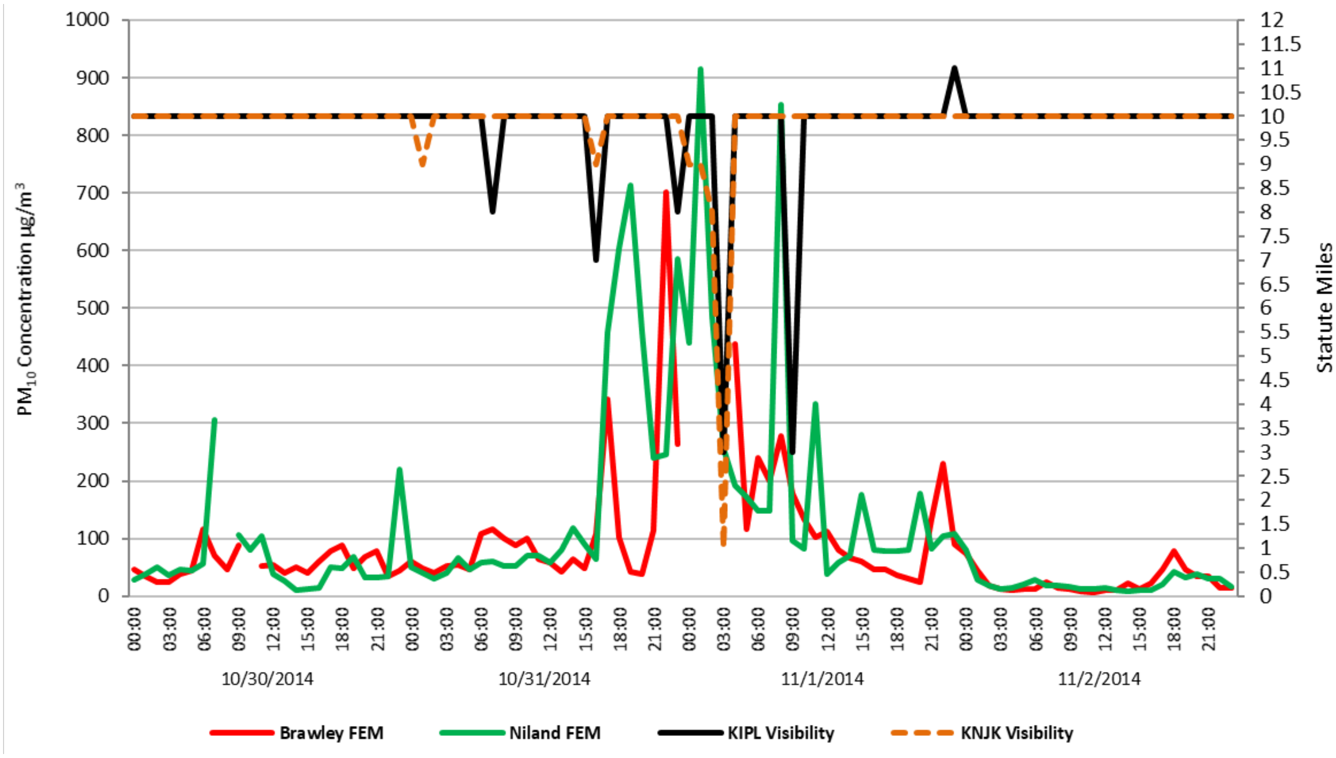

Fig 5-9: Visibility was limited at local airports on November 1, 2014. KIPL reported three miles of limited visibility due to haze at 09:53. KNJK reported one-mile visibility due to haze at 03:09. Air quality data is from the EPA's AQS data bank. Wind data is from the NCEI's QCLCD system

As discussed above a winter-like storm pushed through as a trough of low pressure deepened down the west coast bringing stronger onshore flow and strong gusty westerly winds late Friday October 31, 2014 into Saturday November 1, 2014. In anticipation of the arrival of a trough the San Diego NWS office issued ten (10) Urgent Weather Messages containing wind advisories in and around the San Diego Mountain passes and deserts as early as Thursday, October 30, 2014. The advisories identified areas along Coachella Valley and Interstate 8, which included west winds 25 to 35 mph and reduced visibility due to blowing dust and sand. A useful measurement of the degradation of air quality is the Air Quality Index (AQI).[19]

Figure 5-10 provides the resultant AQI for November 1, 2014. As the trough moved through the area with strong onshore flow the level of reduced air quality became evident when the AQI level changed from a "Yellow" or Moderate level to an "Orange" or "Unhealthy for Sensitive Groups"

[19] The AQI is an index for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health affects you may experience within a few hours or days after breathing polluted air. EPA calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, EPA has established national air quality standards to protect public health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health in this country.

level. The lower air quality affirms that on November 1, 2014 gusty west winds transported windblown dust into Imperial County affecting air quality.

FIGURE 5-10
AIR QUALITY INDEX FOR BRAWLEY NOVEMBER 1, 2014

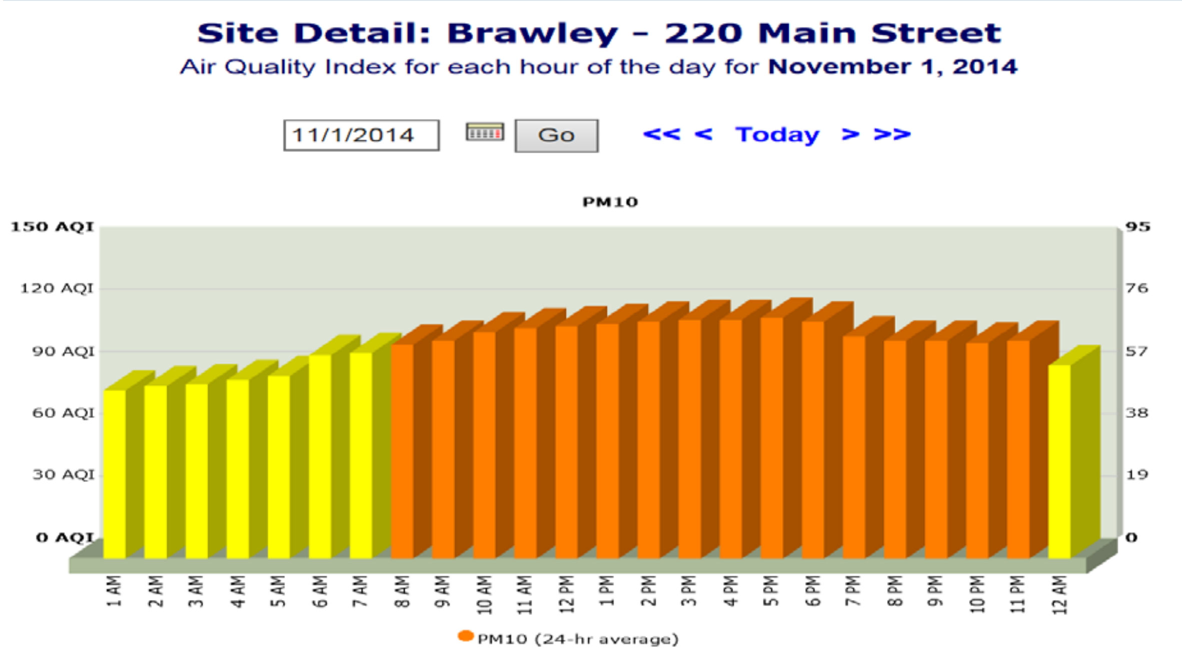

Fig 5-10: Demonstrates that air quality in Imperial County reduced air quality when gusty westerly winds blew into Imperial County transporting windblown dust on October 31, 2014 and November 1, 2014

V.2 Summary

The preceding discussion, graphs, figures, and tables provide wind direction, speed and concentration data illustrating the spatial and temporal effects of the strong gusty westerly winds associated with the passing of a winter-like storm and the deepening of a trough of low-pressure late Friday October 31, 2014 and into Saturday November 1, 2014.

The information provides a clear causal relationship between the transported windblown dust and the PM_{10} exceedance measured at the Brawley, Niland and Westmorland monitors on October 31, 2014 and November 1, 2014. Furthermore, the issued Urgent Weather Messages and the air quality index illustrate the affect upon air quality within the region extending from the mountains and desert slopes of San Diego County, all of Imperial County and the southern portion of Riverside County. Large amounts of coarse particles (dust) and PM_{10} transported by strong gusty westerly winds into the lower atmosphere caused a change in the air quality conditions within Imperial County. The entrained windblown dust originated from as far as the mountains and desert slope areas located within San Diego County and Imperial County (part of the Sonoran Desert). Combined, the information demonstrates that the elevated PM_{10}

concentrations measured on October 31, 2014 and November 1, 2014 coincided with measured elevated wind speeds and gusts in the southern portion of Riverside County, southeastern San Diego County, all of Imperial County, and parts of Arizona.

FIGURE 5-11
OCTOBER 31, 2014 AND NOVEMBER 1, 2014 WIND EVENT TAKEAWAY POINTS

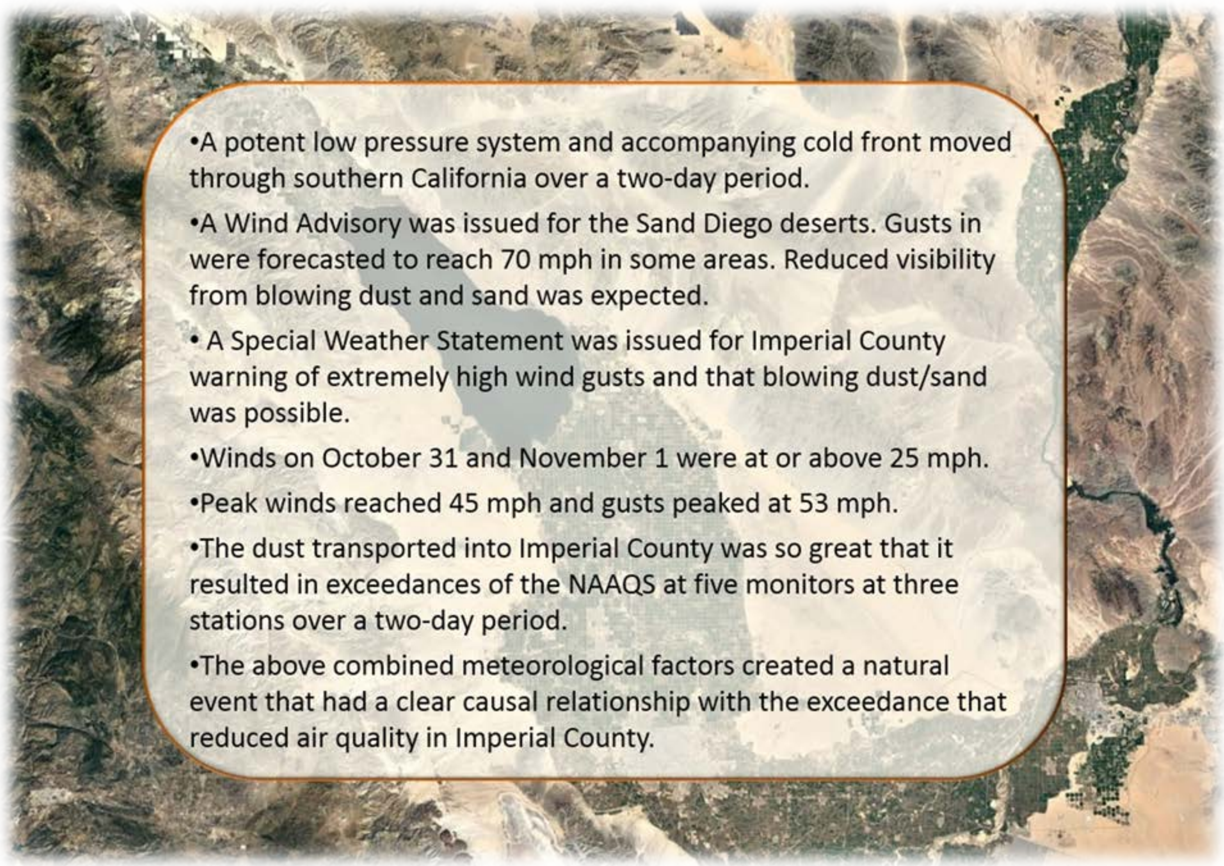

Fig 5-11: Illustrates the factors that qualify the October 31, 2014 and November 1, 2014 natural event which affected air quality as an Exceptional Event

VI Conclusions

The PM_{10} exceedance that occurred on October 31, 2014 and November 1, 2014, satisfies the criteria of the EER which states that in order to justify the exclusion of air quality monitoring data evidence must be provided for the following elements:

TABLE 6-1 TECHNICAL ELEMENTS CHECKLIST EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM_{10})		DOCUMENT SECTION
1	A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s)	6-34
2	A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation	53-69
3	Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section	35-45
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	46-52
5	A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event	46-68

VI.1 Affects Air Quality

The preamble to the revised EER states that an event has affected air quality if the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation. Given the information presented in this demonstration, particularly Section V, we can reasonably conclude that there exists a clear causal relationship between the monitored exceedance and the October 31, 2014 and November 1, 2014 event, which changed or affected air quality in Imperial County.

VI.2 Not Reasonably Controllable or Preventable

Section 50.1(j) of 40 CFR Part 50 defines an exceptional event as an event that must be "not reasonably controllable or preventable" (nRCP). The revised preamble explains that the nRCP has two prongs, not reasonably preventable and not reasonably controllable. A natural wind event, which transports dust from natural open deserts, meets the nRCP, when sources are controlled by BACM and when human activity plays little to no direct causal role. This demonstration provides evidence that despite BACM in place within Imperial County, high winds overwhelmed all BACM controls where human activity played little to no direct causal role. The

PM_{10} exceedance measured at the Brawley, Niland and Westmorland monitors caused by naturally occurring strong gusty west winds transported windblown dust into Imperial County and other parts of southern California from areas located within the Sonoran Desert regions to the west and southwest of Imperial County. These facts provide strong evidence that the PM_{10} exceedance at Brawley, Niland and Westmorland monitors on October 31, 2014 and November 1, 2014 were not reasonably controllable or preventable.

VI.3 Natural Event

The revised preamble to the EER clarifies that a "Natural Event" (50.1(k) of 40 CFR Part 50), which may recur at the same location, is an event where human activity plays little or no direct causal role. The criteria that human activity played little or no direct causal role occurs when the event, along with its resulting emissions, are solely from natural sources or where all significant anthropogenic sources of windblown dust have been reasonably controlled. As discussed within this demonstration, windblown dust anthropogenic sources reasonably controlled with BACM in and around Brawley, Niland and Westmorland on October 31, 2014 and November 1, 2014 meet the criteria that human activity played little or no direct causal role therefore, the event qualifies as a natural event.

VI.4 Clear Causal Relationship

The time series plots of PM_{10} concentrations at Brawley, Niland and Westmorland during different days, and the comparative analysis of different monitors in Imperial and Riverside counties demonstrates a consistency of elevated gusty westerly winds and concentrations of PM_{10} on October 31, 2014 and November 1, 2014 (Section V). In addition, these time series plots and graphs demonstrate that the high PM_{10} concentrations and the gusty westerly winds were an event that was widespread, regional and not preventable. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty westerly winds. Days immediately before and after the high wind event PM_{10} concentrations were well below the NAAQS. Overall, the demonstration provides evidence of the strong correlation between the natural event and the windblown dust emissions to the exceedance on October 31, 2014 and November 1, 2014.

VI.5 Historical Concentrations

The historical annual and seasonal 24-hr average PM_{10} concentrations measured at the Brawley, Niland and Westmorland monitors were historically unusual compared to a multi-year data set (Section III).

Appendix A: Public Notification that a potential event was occurring (40 CFR §50.14(c)(1)(i))

This section contains issued notices by the NWS and Imperial County pertinent to the October

31, 2014 and November 1, 2014 event. Along with NWS notices, this Appendix contains any issued air quality alerts. Air quality alerts advise sensitive receptors of potentially unhealthy conditions in Imperial County resulting from a natural event. On October 31, 2014 and November 1, 2014, the data illustrates a region-wide increase in wind speeds and wind gusts coincident with the arrival of dust and high PM_{10} concentrations in Imperial County.

Appendix B: Meteorological Data

This Appendix contains the time series plots, graphs, wind roses, etc. for selected monitors in Imperial and Riverside Counties. These plots, graphs and tables demonstrate the regional impact of the wind event.

Appendix C: Correlated PM_{10} Concentrations and Winds

This Appendix contains the graphs depicting the correlations between PM_{10} Concentrations and elevated wind speeds for selected monitors in Imperial and Riverside Counties. These graphs demonstrate the region wide impact of the wind event.

Appendix D: Regulation VIII – Fugitive Dust Rule

This Appendix contains the compilation of the BACM adopted by the Imperial County Air Pollution Control District and approved by the United States Environmental Protection Agency. A total of seven rules numbered 800 through 806 comprise the set of Regulation VIII Fugitive Dust Rules.